THE LIGHTHOUSE SERVICE

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OF THE

UNITED STATES GOVERNMENT

No. 40

INSTITUTE FOR GOVERNMENT RESEARCH

THE LIGHTHOUSE SERVICE

ITS HISTORY, ACTIVITIES AND ORGANIZATION

THE INSTITUTE FOR GOVERNMENT RESEARCH

Washington, D. C.

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INSTITUTE FOR GOVERNMENT RESEARCH

SERVICE MONOGRAPHS
OF THE
UNITED STATES GOVERNMENT
No. 40

THE LIGHTHOUSE SERVICE

ITS HISTORY, ACTIVITIES AND ORGANIZATION

BY
GEORGE WEISS

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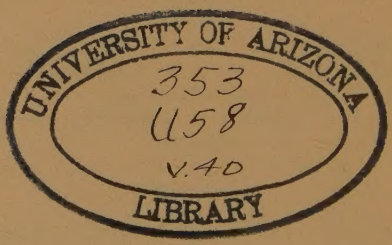

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FOREWORD

The first essential to efficient administration of any enterprise is full knowledge of its present make-up and operation. Without full and complete information before them, as to existing organization, personnel, plant, and methods of operation and control, neither legislators nor administrators can properly perform their functions.

The greater the work, the more varied the activities engaged in, and the more complex the organization employed, the more imperative becomes the necessity that this information shall be available—and available in such a form that it can readily be utilized.

Of all undertakings, none in the United States, and few, if any, in the world, approach in magnitude, complexity, and importance that of the national government of the United States. As President Taft expressed it in his message to Congress of January 17, 1912, in referring to the inquiry being made under his direction into the efficiency and economy of the methods of prosecuting public business, the activities of the national government "are almost as varied as those of the entire business world. The operations of the government affect the interest of every person living within the jurisdiction of the United States. Its organization embraces stations and centers of work located in every city and in many local subdivisions of the country. Its gross expenditures amount to billions annually. Including the personnel of the military and naval establishments, more than half a million persons are required to do the work imposed by law upon the executive branch of the government.

"This vast organization has never been studied in detail as one piece of administrative mechanism. Never have the foundations been laid for a thorough consideration of the relations of all of its parts. No comprehensive effort has been made to list its multifarious activities or to group them in such a way as to present a clear picture of what the government is doing. Never has a complete description been given of the agencies through which these activi-

ties are performed. At no time has the attempt been made to study all of these activities and agencies with a view to the assignment of each activity to the agency best fitted for its performance, to the avoidance of duplication of plant and work, to the integration of all administrative agencies of the government, so far as may be practicable, into a unified organization for the most effective and economical dispatch of public business."

To lay the basis for such a comprehensive study of the organization and operations of the national government as President Taft outlined, the Institute for Government Research has undertaken the preparation of a series of monographs, of which the present study is one, giving a detailed description of each of the fifty or more distinct services of the government. These studies are being vigorously prosecuted, and it is hoped that all services of the government will be covered in a comparatively brief space of time. Thereafter, revisions of the monographs will be made from time to time as need arises, to the end that they may, as far as practicable, represent current conditions.

These monographs are all prepared according to a uniform plan. They give: first, the history of the establishment and development of the service; second, its functions, described not in general terms, but by detailing its specific activities; third, its organization for the handling of these activities; fourth, the character of its plant; fifth, a compilation of, or reference to, the laws and regulations governing its operations; sixth, financial statements showing its appropriations, expenditures and other data for a period of years; and finally, a full bibliography of the sources of information, official and private, bearing on the service and its operations.

In the preparation of these monographs the Institute has kept steadily in mind the aim to produce documents that will be of direct value and assistance in the administration of public affairs. To executive officials they offer valuable tools of administration. Through them, such officers can, with a minimum of effort, inform themselves regarding the details, not only of their own services, but of others with whose facilities, activities, and methods it is desirable that they should be familiar. Under present conditions services frequently engage in activities in ignorance of the fact that the work projected has already been done, or is in process of execution by other services. Many cases exist where one service could

make effective use of the organization, plant or results of other services had they knowledge that such facilities were in existence. With the constant shifting of directing personnel that takes place in the administrative branch of the national government, the existence of means by which incoming officials may thus readily secure information regarding their own and other services is a matter of great importance.

To members of Congress the monograph should prove of no less value. At present these officials are called upon to legislate and appropriate money for services concerning whose needs and real problems they can secure but imperfect information. That the possession by each member of a set of monographs such as is here projected, prepared according to a uniform plan, will be a great aid to intelligent legislation and appropriation of funds can hardly be questioned.

To the public, finally, these monographs will give that knowledge of the organization and operations of their government which must be had if an enlightened public opinion is to be brought to bear upon the conduct of governmental affairs.

These studies are wholly descriptive in character. No attempt is made in them to subject the conditions described to criticism, nor to indicate features in respect to which changes might with advantage be made. Upon administrators themselves falls responsibility for making or proposing changes which will result in the improvement of methods of administration. The primary aim of outside agencies should be to emphasize this responsibility and facilitate its fulfillment.

While the monographs thus make no direct recommendations for improvement, they cannot fail greatly to stimulate efforts in that direction. Prepared as they are according to a uniform plan, and setting forth as they do the activities, plant, organization, personnel and laws governing the several services of the government, they will automatically, as it were, reveal, for example, the extent to which work in the same field is being performed by different services, and thus furnish the information that is essential to a consideration of the great question of the better distribution and coördination of activities among the several departments, establishments, and bureaus, and the elimination of duplications of plant, organization and work. Through them it will also be possible to

subject any particular feature of the administrative work of the government to exhaustive study, to determine, for example, what facilities, in the way of laboratories and other plant and equipment, exist for the prosecution of any line of work and where those facilities are located; or what work is being done in any field of administration or research, such as the promotion, protection and regulation of the maritime interests of the country, the planning and execution of works of an engineering character, or the collection, compilation and publication of statistical data, or what differences of practice prevail in respect to organization, classification, appointment, and promotion of personnel.

To recapitulate, the monographs will serve the double purpose of furnishing an essential tool for efficient legislation, administration and popular control, and of laying the basis for critical and constructive work on the part of those upon whom responsibility for such work primarily rests.

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THE LIGHTHOUSE SERVICE

ITS HISTORY, ACTIVITIES, AND ORGANIZATION

CHAPTER I

HISTORY

The Lighthouse Service is a bureau of the Department of Commerce which is charged with the establishment and maintenance of all aids to navigation on the coasts and rivers of the United States. The term "aids to navigation" comprises all land and sea marks established for, or adapted to, the purpose of aiding the navigation of vessels, and includes light stations, lightships, fog signals, buoys of all kinds, and day beacons.

Lighthouse Undertakings of the Colonies. Prior to the Revolution the seaboard colonies had installed several light beacons along their coasts. The first lighthouse to be erected in this country, and probably the first on the American continent, was built by the Province of Massachusetts in 1716 on Little Brewster Island at the entrance to Boston Harbor. This light was supported by a light tax of one penny per ton on all incoming and outgoing vessels except coasters. The coasters paid two pence each at their clearance out, and all fishing vessels, wood sloops, etc., paid five shillings each year.[1]

Subsequently several other lighthouses were built by the colonies. These, with the year of their establishment, were:

Brant Point Light, Nantucket Harbor, Mass., 1746
Beavertail Light, Conanicut Island, Narragansett Bay, R. I., 1749
New London Harbor Light, Conn., 1760
Sandy Hook Light, entrance to New York Bay, 1764
Cape Henlopen Light, entrance to Delaware Bay, Del., 1765

[1] *Boston News Letter,* September 17, 1716; quoted by Putnam, Lighthouses and lightships of the United States, p. 1.

7 Charleston Light, on Morris Island, S. C., 1767
8 Plymouth Light, on Gurnet Point, Mass., 1768
Portsmouth Light, entrance to Portsmouth Harbor, N. H., 1771
Cape Ann Lights, Thatchers Island, Mass., 1771
Nantucket Light, Great Point, Nantucket Island, Mass., 1784
12 Newburyport Harbor Lights, Mass., 1788

Three other lighthouse stations had been undertaken by the colonies, but were not in operation at the organization of the National Government. These were Portland Head Light, Maine, completed in 1791; Tybee Light, at the entrance to Savannah River, Georgia, 1791; Bald Head Light, at the entrance to Cape Fear River, North Carolina, 1796. In addition, Virginia had collected the materials for a lighthouse at Cape Henry, at the entrance to Chesapeake Bay, but had not commenced construction. All these stations are still in operation, excepting that one of the two lights at Portsmouth has been discontinued. At Sandy Hook and Cape Henlopen, the old masonry towers are still in use. For the most part, however, the original structures have been added to or entirely replaced.

Origin and Development of a National Service. The history of the Lighthouse Service as an administrative unit of the United States Government is practically coincident with that of the United States itself. One of the first official acts of President Washington was to write a letter to the keeper of Sandy Hook Light, directing him to keep the light burning until Congress should provide for its maintenance. The Service formally became an administrative unit of the government by act of Congress, approved August 7, 1789 (1 Stat. L., 53). This act was the ninth law passed by Congress and the first provision for any public work. It accepted title to, and joined jurisdiction over, the lighthouses then in existence, and provided:

That all expenses which shall accrue from and after the fifteenth day of August, one thousand seven hundred and eighty-nine, in the necessary support, maintenance and repairs of all lighthouses, beacons, buoys and public piers erected, placed, or sunk before the passing of this act, at the entrance of, or within any bay, inlet, harbor, or port of the United States, for rendering the navigation thereof easy and safe, shall be defrayed out of the treasury of the United States: *Provided nevertheless,* That none

of the said expenses shall continue to be so defrayed by the United States, after the expiration of one year from the day aforesaid, unless such lighthouses, beacons, buoys and public piers, shall in the mean time be ceded to and vested in the United States, by the state or states respectively in which the same may be, together with the lands and tenements thereunto belonging, and together with the jurisdiction of the same.

After considerable delay in some instances, the several states between 1789 and 1797 ceded their lighthouses to the United States. This delay occasioned the passage of several amendatory acts (1 Stat. L., 137; 218; 339; 393; and 425), extending the time within which the National Government would defray expenses of lights still under state control. Beginning in 1789 the jurisdiction over, and the maintenance of, lighthouses and other aids to navigation have been in the National Government, and the lighthouses of the United States, supported by appropriations out of the general revenues, have been free to the vessels of all nations.

The act of 1789, taking over the operation of the lighthouses, put the care and superintendence of the Lighthouse Establishment under the Treasury Department. Section 3 directed the Secretary of the Treasury to provide by contract, with the approval of the President of the United States, for the building of a lighthouse at the entrance of Chesapeake Bay and also for "rebuilding when necessary, and keeping in good repair, the lighthouses, beacons, buoys, and public piers in the several states, and for furnishing the same with all necessary supplies." A further provision authorized the Secretary of the Treasury to pay the salaries and wages of persons appointed by the President for the supervision and maintenance of the aids to navigation.

As the first Secretary of the Treasury, the care and superintendence of the lights devolved upon Alexander Hamilton. It is interesting to note how much attention was given in the early history of our government by the highest officers of the country to matters of detail concerning the Lighthouse Establishment. Many orders and contracts of a comparatively insignificant nature bear the personal approval of George Washington, Alexander Hamilton, and Thomas Jefferson.

In 1792 the office of Commissioner of Revenue was created, and Hamilton assigned the superintendence of lighthouse matters

to that office. This duty remained with the Commissioner of Revenue until 1820, except for the period from 1802 to 1813 when, the office of Commissioner of Revenue being temporarily abolished, the duties of lighthouse supervision were again performed by the Secretary of the Treasury, then Albert Gallatin. The office of Commissioner of Revenue was a second time abolished by the act of December 23, 1817. This act became effective July 1, 1820, when the duties of that office, including the superintendence of the Lighthouse Establishment, were transferred to the Fifth Auditor of the Treasury.

During the thirty years that had elapsed since the lights had come under national control, the number had been increased by congressional enactment from twelve to fifty-five. Each light seems to have been built to meet an immediate and pressing local need, without any reference to a general system.

The Fifth Auditor of the Treasury as Superintendent of Lights. The Fifth Auditor of the Treasury filled the post of "General Superintendent of Lights" from 1820 until the creation of the Lighthouse Board in 1852. For the greater part of that period he acted on the authority delegated to him by the Secretary of the Treasury. His duties were put on a statutory basis by the act of March 3, 1845 (5 Stat. L., 752, 762), which prescribed that "the Fifth Auditor of the Treasury, shall continue to superintend the several matters and things connected with the light-houses, beacons, buoys, and public piers, as heretofore, of the United States, and to perform all the duties connected therewith, under the direction of the Secretary of the Treasury, until otherwise ordered by law." The Fifth Auditor executed the orders of Congress and signed agreements and contracts on the part of the government. To him was necessarily delegated considerable discretionary power. Stephen Pleasanton, as Fifth Auditor, supervised the lighthouse work for nearly thirty-three years.

For many years the supply and even the inspection of the lighthouses as well as new construction were performed mainly by contract. During Gallatin's time, oil and money to purchase other supplies were furnished to a contractor, who made yearly visits to each light to keep the illuminating apparatus in repair and at the same time to furnish supplies for the following year.[2]

[2] Johnson, Modern lighthouse service, p. 15.

The first broad contract for the maintenance of lighthouses was made in 1812, when Congress authorized the Secretary of the Treasury (2 Stat. L., 691), to purchase Winslow Lewis' patent for a "reflecting and magnifying lantern" and to contract "with the said Winslow Lewis for fitting up and keeping in repair, any or all of the lighthouses in the United States or territories thereof, upon the improved plan of the reflecting and magnifying lanterns." In addition the contract provided for furnishing supplies and for keeping the apparatus in repair for a period of seven years.

The Lewis apparatus was apparently the same as the Argand lamp and parabolic reflector, already in use in Europe for some time, with the addition of a lens—one solid piece of glass—in front of the lamp. The introduction of these magnifying lanterns seems in the main to have been an important improvement over the crude lamps before used, "but the bulls-eye lens in the combination was worse than useless."[3] It was not finally removed, however, for some years. Contracts for its supply and maintenance were continued until 1828.

Early Field Service. At this time the field service of the Lighthouse Establishment had no distinctive organization. The collectors of customs acted as local superintendents of lights for particular districts convenient to their ports. They had local supervision over the light stations and light keepers, including repair and construction, recommendation of keepers for appointment, and disbursement of funds. As extra compensation they were allowed 2½ per cent commission on all lighthouse disbursements.

Prior to the act of September 28, 1850 (9 Stat. L., 500, 504), there was no legal authority for assigning the collectors of customs to lighthouse duty. Section 9 of that act authorized the Secretary of the Treasury to assign to any of the collectors of customs, the superintendence of such lighthouses, beacons, lightships, and buoys as he might deem best. The same act stipulated that no collector of customs whose annual salary exceeded $3000 a year should receive any compensation as disbursing officer in the Lighthouse Establishment. In no case was the compensation of collectors of customs for disbursements in the Lighthouse Service to exceed $400 in any fiscal year.

[3] Putnam, p. 40.

In 1792 there were eleven collectors of customs acting as superintendents of lights. Of the seventeen superintendents in 1817, several had but one light each in their charge, while the superintendent at Boston had twenty-one lighthouses. George Bancroft, while collector of the port at Boston, from 1837 to 1841, served as lighthouse superintendent, and during part of this period was charged with the purchase of all oils for the Service. In 1854 there were sixty-three customs officers acting as superintendents. In 1880 the collectors of customs ceased to make lighthouse disbursements, and later their other duties in connection with lighthouses were transferred to the Lighthouse Board.

Maintenance under Contract. Additional contracts for new works and maintenance were made until 1842. In 1832 the Fifth Auditor entered into a five-year contract for the furnishing of all supplies needed for the whole Establishment and for keeping all the illuminating apparatus in complete repair. Under the terms of this contract the government paid $31.98 per lamp per year for the supply of everything necessary for the upkeep of the lights. The contractor was to visit each lighthouse annually and render a statement of its condition to the Fifth Auditor, and also to report on the conduct and ability of the keepers. In 1837 a similar contract was executed.[4] Under the latter agreement the government paid $35.87½ per lamp per year for each light that was maintained.

Under this system the contractors virtually administered the lighthouse organization and exercised wide discretion in performing their contracts. In 1835 a contractor changed the Mobile Point Light from a fixed to a revolving light without previous instructions. Sub-letting of contracts was a common practice, so that in many cases those actually engaged in the lighthouse work were not directly responsible to the government.

Beginning with 1827 Congress had passed liberal appropriations for additional lighthouses. At this time, also, important improvements in lighthouse illuminating apparatus were being made in Europe. After a few years complaints began to arise as to the efficiency of American lighthouses, and questions were raised as to the need for new stations authorized. The most

[4] 25 Cong. 2 sess., S. doc. 428, p. 13.

prominent of the early complainants were E. and G. W. Blunt, publishers of Blunt's "Coast Pilot." On November 30, 1837, they submitted a statement to the Secretary of the Treasury, in which they argued that "the whole lighthouse system needs revision, a strict superintendence and an entirely different plan of operation."[5]

Early Investigations of the Service. In 1837 Congress began to make restrictions, partly on itself. It provided in the act of March 3 of that year (5 Stat. L., 181, 185), making appropriations for building a large number of lighthouses, light boats, etc., that before any of these improvements should be begun, the Board of Navy Commissioners should make an examination to determine whether safety of navigation required any additional facilities, and, if so, what was the most suitable for each place. The Board was instructed to report its opinion with regard to all proposed lighthouses to the Secretary of the Treasury, who was to proceed with the work recommended. Any of the improvements that the Board considered unnecessary or inexpedient were not to be made: The Commissioners' opinions, with the facts, were to be reported to Congress.

The Navy Department detailed to this duty twenty-two officers, who made their report by the end of the year to the Naval Board, which in turn laid its report[6] before Congress. As a result of the recommendations, the construction of thirty-one lighthouses already appropriated for was deferred.

On March 22, 1838, the Senate passed a resolution[7] instructing the Committee on Commerce to inquire into the expediency of importing one or more sets of the most approved apparatus then being employed in European lighthouses and further authorizing the committee to inquire whether a more efficient, safe, and useful system of locating, constructing, lighting, and managing the lighthouses necessary for our coasts might not be adopted.

In accordance with this resolution the Committee on Commerce, on May 10, 1838, made its report,[8] including a letter of the Fifth

[5] This statement, together with a report of the Fifth Auditor, was transmitted to the Senate on January 26, 1838, in response to a Senate resolution of the previous day and printed as 25 Cong. 2 sess., S. doc. 138.

[6] 25 Cong. 2 sess., H. ex. doc. 41.

[7] 25 Cong. 2 sess., S. Jour., p. 307.

[8] 25 Cong. 2 sess., S. doc. 428.

Auditor, Mr. Pleasanton, dated May 3, 1838,[9] which briefly traced the development of the lighthouse work from 1820, the year he took over its administration. Under his superintendence the Lighthouse Establishment had increased from fifty-five lighthouses and a few buoys to 210 lighthouses and twenty-eight lightships and numerous buoys, daymarks, etc. In his opinion the arrangements in force for managing those aids to navigation were the most simple and the most economical that could be devised and at the same time "sufficiently effectual." He concluded his letter by recommending the creation of an office to be known as "The Auditor of the Department of State and General Superintendent of the Lighthouse Establishment"; this office to take the active as well as the nominal control of the operation of the lighthouse system out of the hands of the Secretary of the Treasury and to assume the sole responsibility for the administration of the service.

The result of the discussion which followed the report of the Committee on Commerce was the inclusion in the current appropriation act for building lighthouses, etc. (5 Stat. L., 289, 292), of funds for carrying on experiments with various lighthouse equipment. It provided for the importation and experimental use of two sets of dioptric or lenticular apparatus and of one set of reflector apparatus. These were to be set up and tested and their efficiency compared with the lights then in use. Authorization was also given the Secretary of the Treasury to "ascertain the merits of the patent fog-bell of Andrew Morse, Jr., and if he deems it expedient to establish one on the coast," and the sum of $2500 was appropriated for the purpose.

In order further to acquaint itself with the lighthouse system and its work, Congress authorized the President to

> . . . divide the Lake and Atlantic coast into such districts as he may deem expedient; and he shall appoint a Naval Officer or officers if the public service will allow of it, to survey and examine each district with reference to all of the objects aforesaid; and it shall be their further duty to inspect all the light-houses light-boats, buoys, beacons, etc.; and to report upon their present condition and usefulness; also to inquire and report whether the present public emergencies require any, and, if any, what further additional works and improvements of the above description, and

[9] *Ibid.*, p. 9.

of what kind; and also further to report whether, in their judgment, the public interest requires any modification of the system of erecting, superintending, and managing the light-houses, light-boats, etc., and if so, in what particulars, and each board shall report separately on all these matters which reports will be laid before Congress.[10]

Under this act the President divided the Atlantic Coast into six, and the Lake Coast into two districts; and in August, 1838, a naval officer was assigned to each district.

By this time Congress apparently decided that a change was desirable. On February 18, 1842, the House of Representatives passed a resolution requesting the Committee on Commerce to make an inquiry into the expenditures of the Lighthouse Establishment since the year 1816; to inquire into the expediency of providing by law for a retrenchment in the expenditures for light-house work; to examine into the question of reorganizing the establishment and changing the method of superintendence, and finally to ascertain whether the Service ought not to be placed under the Topographical Bureau of the War Department.

The Committee made its report to Congress in May, 1842.[11] On the whole it seemed to find the operation and administration of the lighthouse work reasonably satisfactory. It opposed the transfer of the Service to any other department, stating "that a transfer of the duties of the Treasury Department, imposed by law in regard to our lighthouse establishment is not called for by the public good."

The Committee made one important recommendation in regard to the inspection of lighthouse works. It suggested that permanent inspectors be appointed whose duty it should be to devote their entire time, under the general direction of the Superintendent of Lights, to frequent examinations of lighthouses, light boats, buoys, etc. No congressional action followed the receipt of this report.

On the day that the Committee on Commerce reported to the House, the Secretary of the Treasury appointed I. W. P. Lewis as special agent to visit some of the lighthouses, to make a general and detailed survey of the lights and their management, and to draw up a plan giving a complete system of illumination for

[10] 5 Stat. L., 289, 292.
[11] 27 Cong. 2 sess., H. rep. 811.

the whole coast of the United States. This seems to have been the first instance in which an engineer had been directly employed in any important capacity in the Lighthouse Service.[12] Lewis visited about seventy lighthouses along the New England coast, or approximately one-third of the major aids to navigation in the entire Establishment, and reported as to the condition of each one.[13] His examination showed that some change in the illuminating apparatus as well as in the administration of the Service was desirable.

On June 19, 1845, the Secretary of the Treasury, then Robert J. Walker, initiated a further investigation. He had Lieutenants Thornton A. Jenkins and Richard Bache detailed for that purpose from the Navy and sent abroad to procure information which might tend to the improvement of the lighthouse system of the United States. In submitting the report of these two officers, which recommended many changes in the lighthouses of this country and in their administration, the Secretary of the Treasury asked that a board be appointed to consider thoroughly the matter of lighthouse improvements.[14] Congress received these reports as it had the previous ones, and no legislative action resulted.

The Lighthouse Establishment had by this time increased from the fifty-five lighthouses and 156 buoys in 1820 to 325 lighthouses and lightships with almost one thousand buoys, fog signals, and other aids to navigation. "It is true that many of the lighthouses then built were later rebuilt more substantially, yet the class of work done probably met at a moderate cost the immediate needs of a growing country." [15]

A Planning Board Created. Finally Congress acted. It provided in the act of March 3, 1851 (9 Stat. L., 627, 629), making appropriations for lighthouses, lightboats, etc., that engineer offi-

[12] Putnam, p. 42. As far back as 1831, however, funds appropriated for lights on the lakes had been placed by the Treasury Department in the hands of officers of the Engineer Corps for disbursement, and as early as 1833 the annual report of the Chief of Engineers makes mention of lighthouses among the internal improvements being constructed by this service.—See Institute for Government Research, Office of the Chief of Engineers. Service Monograph 27.

[13] 27 Cong. 3 sess., H. ex. doc. 183.

[14] 29 Cong. 1 sess., H. ex. doc. 222.

[15] Putnam, p. 41.

cers be detailed from the Army from time to time to superintend the construction and renovation of lighthouses. It authorized the use of the Fresnel illuminating apparatus and its substitution for the existing equipment as rapidly as the Secretary of the Treasury should think best. It also instructed the Secretary of the Treasury to appoint a board composed of two naval officers of high rank, two officers of engineers of the Army, and a civil officer of high scientific attainments, with a junior officer of the Navy to act as secretary, whose duty it should be, under instructions from the Treasury Department, to make a detailed report and program to guide legislation in extending and improving the system of construction, illumination, inspection, and superintendence of the Lighthouse Establishment.

In accordance with this legislation the Secretary of the Treasury, on May 21, 1851, appointed a board consisting of Captain W. B. Shubrick and Commander S. F. Dupont of the Navy, Brevet Brigadier General Joseph G. Totten of the Corps of Engineers, Lieutenant Colonel James Kearney of the Corps of Topographical Engineers, and Professor Alexander D. Bache, Superintendent United States Coast Survey, with Lieutenant Thornton S. Jenkins, United States Navy, as Secretary.

The Board made an extensive study of the lights and other aids to navigation and of the administration of the Service. It introduced a vast amount of evidence comparing the condition of American lights with those of France and Great Britain. In general it contended that the aids to navigation in this country as well as the method of their administration were far inferior to those of European countries. In its report, dated January 30, 1852,[16] it recommended a complete reorganization.

Among other changes it urged that the aids to navigation be operated as a single system rather than as a mass of local and unrelated lights. To this end it recommended the classification of the lights after the French method and the substitution of the Fresnel lenticular system of illuminating apparatus for the Argand lamps and parabolic reflectors then extensively in use. Finally, to insure a "more vigorous" administration, it recommended the appointment of a permanent board to take over the complete supervision of the lighthouse service.

[16] 32 Cong. 1 sess., S. ex. doc. 28.

The Fifth Auditor and Superintendent of the Lighthouse Establishment, Mr. Pleasanton, made reply to this report. He took exception to most of the findings of the Board, and contended especially that a board, however composed, would not be the proper authority to which to delegate the administration of the Lighthouse Service. He urged that a single officer, under the Secretary of the Treasury, with full powers and responsibility, would insure the most efficient and economical administration.

Congress, however, took up the Board's suggestions and on August 31, 1852, embodied them in the act (10 Stat. L., 112, 119) which entirely reorganized the Lighthouse Establishment and created the Lighthouse Board as its governing head.

Administration of the Service by the Lighthouse Board: 1852-1910. The Lighthouse Board administered the aids to navigation for nearly fifty-eight years. The more important features of the basic act under which the Board functioned were as follows:

SEC. 8. That the President be, and he is hereby, authorized and required to appoint, immediately after the passage of this act, two officers of the navy, of high rank, one officer of the corps of engineers of the army, one officer of the corps of topographical engineers of the army, and two civilians of high scientific attainments, whose services may be at the disposal of the President; and an officer of the navy and an officer of engineers of the army, as secretaries, who shall constitute the Light-house Board of the United States, and shall have power to adopt such rules and regulations for the government of their meetings, as they may judge expedient; and the board so constituted shall be attached to the office of the Secretary of the Treasury, and under his superintendence shall discharge all the administrative duties of said office relating to the construction, illumination, inspection, and superintendence of lighthouses, light-vessels, beacons, buoys, seamarks, and their appendages and embracing the security of foundations of works already existing, procuring illuminating and other apparatus, supplies, and materials of all kinds for building and for rebuilding when necessary, and keeping in good repair, the light-houses, light-vessels, beacons, and buoys of the United States.

* * * *

SEC. 10. That the Light-house Board shall meet four times in each year for the transaction of general and special business, each meeting to commence on the first Monday in March, June, September, and December, and that the Secretary of the Treasury

is hereby authorized to convene the Light-house Board whenever, in his judgment, the exigencies of the service may require it.
* * * *

SEC. 12. That it shall be the duty of the Light-house Board, immediately after being organized, to arrange the Atlantic, Gulf, Pacific, and Lake Coasts of the United States into light-house districts, not exceeding twelve in number; and the President is hereby authorized and required to direct, that an officer of the army or navy be assigned to each district as a light-house inspector, subject to and under the orders of the Light-house Board, who shall receive for such service the same pay and emoluments that he would be entitled to by law for the performance of duty in the regular line of his profession and no other, except the legal allowance per mile, when travelling under orders connected with his duties.

SEC. 13. That the said Light-house Board by and with the consent and approbation of the Secretary of the Treasury, be authorized and required to cause to be prepared and distributed among the light-keepers, inspectors, and others employed in the Light-house Establishment, such rules, regulations, and instructions as shall be necessary for securing an efficient uniform, and economical system of administering the Light-house Establishment of the United States, and to secure responsibility for them, which rules, regulations, and instructions, when approved, shall be respected and obeyed until altered and annulled by the same authority.

SEC. 14. That it shall be the duty of the Light-house Board to cause to be prepared by the engineer secretary of the board, or by such officer of engineers of the army as may be detailed for that service, all plans, drawings, specifications, and estimates of cost, of all illuminating and other apparatus, and of construction and repair of towers, buildings, etc., connected with the Light-house Establishment, and no bid or contract shall be accepted or entered into except upon the decision of the board, at a regular or special meeting, and through their properly authorized officers.

SEC. 15. That hereafter all materials for the construction and repair of light-houses, light-vessels, beacons, buoys, etc., shall be procured by public contracts, under such regulations as the board may from time to time adopt, subject to the approval of the Secretary of the Treasury, and all works of construction, renovation, and repair shall be made by the orders of the board, under the immediate superintendence of their engineer secretary, or of such engineer of the army as may be detailed for that service.
* * * *

SEC. 17. . . . *Provided,* That no additional salary shall be allowed to any civil, military, or naval officer who shall be employed on the Light-house Board, or who may be in any manner attached to the light-house service of the United States under

this act: *And provided further,* That it shall not be lawful for any member of the Light-house Board, inspector, light-keeper, or other person in any manner connected with the light-house service, to be engaged either directly or indirectly in any contract for labor, materials, or supplies for the light-house service, nor to possess either as principal or agent any pecuniary interest in any patent, plan, or mode of construction or illumination, or in any article of supply for the light-house service of the United States.

Under the authority of this act the first Lighthouse Board was created on October 9, 1852. It was composed of the personnel that had constituted the preliminary board, with the addition of Professor Joseph Henry of the Smithsonian Institution, and Captain Edmund L. F. Hardcastle of the Corps of Topographical Engineers as engineer secretary. The Board was divided into committees on finance, engineering, lighthouses, lighting, and experiments, and these committees were in charge of the several branches of the lighthouse work. This division of administrative authority was one of the outstanding features of the Lighthouse Board's organization. The Secretary of the Treasury was by law *ex-officio* President, and the Board was authorized to elect one of its own members as Chairman.

Admiral William B. Shubrick was elected the first Chairman of the Lighthouse Board. With minor interruptions he served for almost nineteen years. Professor Joseph Henry, the only civilian to act in that capacity, was head of the Board for nearly seven years. Many of the officers connected with the Lighthouse Establishment during this period were prominent in the history of the United States. Among the civilian members were Bache, Mendenhall, and Pritchett, Superintendents of the Coast and Geodetic Survey, and Henry Morton, President of the Stevens Institute. Among those delegated from the Navy to serve as members of the Board were Jenkins, Dewey, Evans, and Schley. The Army engineers were represented by Totten, Humphreys, Franklin, Poe, and Casey. Meade, later in command of the Union forces at Gettysburg, was for more than six years engaged in lighthouse duties in Delaware and in Florida. As such he had charge of the design of Sombrero Key Light and of the completion of Sand Key Light, Florida. Semmes, who later became Commander of the Confederate steamer "Alabama," served as a lighthouse inspector and as naval secretary of the Lighthouse

Board. General Rosecrans was the engineer of one of the lighthouse districts and General Beauregard had certain special lighthouse duties prior to the Civil War.[17]

The Lighthouse Board took up its work immediately upon being organized. It divided the coasts of the United States into twelve districts; seven on the Atlantic Coast, two on the Lakes, two on the Gulf, and one on the Pacific, and the President assigned an Army or Navy officer to each as inspector. Later an Army engineer officer was detailed to each district as lighthouse engineer, and the district inspectors were nearly always naval officers. None of the officers detailed to the Board or the districts received extra compensation over their regular salaries in the Army, Navy, or civil service.[18]

The Board took immediate steps to institute improvements in the methods and equipment of the Lighthouse Establishment. As new lights were needed it substituted the lens or Fresnel apparatus for the Argand lamp and parabolic reflectors previously used. By 1859 this substitution was practically completed. It perfected the classification of lights after the Fresnel system and attempted to differentiate them by proper distinctions so that mariners might identify and recognize each light. It substituted lighthouses for lightships, wherever practical on protected stations, thereby making considerable saving in operating expense.

Experiments were carried on to develop new and improved aids to navigation. In 1854 the Board introduced the bell buoy. In 1876 it added the first whistling buoy to the lighthouse equipment, and in 1882 it placed the first gas buoy in New York Bay. In addition extensive experiments were made by members of the Board which resulted in the development of the siren fog signal, first installed at Sandy Hook, East Beacon, in 1866.

The Lighthouse Service in the Civil War. The Lighthouse Establishment was much involved in the Civil War, as would be

[17] See Cyclopaedia of American Biography; also Putnam, p. 44.

[18] It is a noteworthy fact that although the Lighthouse Establishment from its very inception was considered to be a distinct and important service, for 121 years the lighthouse work of this country was conducted by officers not appointed primarily for this duty, but assigned from other services or carrying on this work in connection with other duty. This was true not only at the headquarters in Washington but also in the district organization. Up to the time of the creation of the present Bureau of Lighthouses, no compensation was paid to anyone for general lighthouse administration.—See Putnam, p. 38.

expected from the fact that a long coast line was exposed to attack from the sea. A great number of lighthouses were partially or totally destroyed. Nearly all of the light vessels in Chesapeake Bay and to the southward were taken, and a number of them sunk for the purpose of obstructing channels. The total number of lights discontinued during the war was 164. In addition, the work of the Board was severely hampered because of the loss of district engineers and inspectors through assignment to military duties.

The Lighthouse Board coöperated with the military and naval forces in many ways. It relighted important stations from time to time during the war as operations permitted. In many instances, it placed special buoys, lights, and lightships, to facilitate military operations. For example, it placed special aids at the entrances of the York River, Charleston Harbor, and Chesapeake Bay, and also on the James and St. Johns rivers. Other assistance was also rendered the military establishments. By 1866 most of the lights discontinued during the war had been repaired and relighted.

Proposed Transfer to the Navy Department. In 1862 a bill was introduced in the Senate "to reorganize the Navy Department." Among other proposed changes, this reorganization would have resulted in the transfer of the Lighthouse Establishment to the Navy Department. The Secretary of the Treasury, then Salmon P. Chase, requested Admiral Shubrick, Chairman of the Lighthouse Board, to make a report giving his opinion as to the expediency of such a transfer. In response Admiral Shubrick submitted a report[19] in which he expressed the Boards' unanimous disapproval of the proposed change. The Board took this occasion to summarize the results of its ten years' superintendence of the lights. It compared the condition of the aids to navigation prior to 1852 with the "subsequent improvements" perfected in the system under its administration. It further pointed out that since the aids to navigation were intended to help promote commerce, the logical place for the service charged with their administration was in the Treasury Department.[20] The bill failed, and the Light-

[19] 37 Cong. 2 sess., S. misc. doc. 61.

[20] It is perhaps unnecessary to point out that at this time practically all the government agencies concerned with the promotion of commerce were under the jurisdiction of the Secretary of the Treasury.

house Board remained under the jurisdiction of the Secretary of the Treasury.

Another attempt was made in the period 1882 to 1885 to secure the transfer of the Lighthouse Establishment, together with the Life-Saving Service, the Coast Survey, and several other services to the Navy Department. In his annual reports for those years [21] the Secretary of the Navy vigorously argued that these branches of the government, being maritime in nature and purpose, their objects had no connection with the Treasury Department under which they were placed. He contended that the work of the Lighthouse Board was essentially naval in character and could best be administered by the Navy Department. He even went further and contended that the work was of such a nature that it required a "kind of skill and experience that the Navy alone can furnish."

The efforts to effect these transfers aroused such vigorous opposition on the part of the Secretary of the Treasury and the heads of the services involved that no action was taken, and the recommendations were dropped.[22]

Extension of Jurisdiction and Duties. The work of the Lighthouse Board was expanded at different times by enactments of Congress. On March 3, 1859, an act (11 Stat. L., 423, 424) was passed authorizing the Board to use its own discretion in the discontinuance, from time to time, of such lighthouses as might become useless by reason of mutations in commerce, changes in channels, or other causes. The marking of pierheads was provided for in the act of July 15, 1870 (16 Stat. L., 291, 309), which directed the Board to mark all pierheads belonging to the United States situated on the northern and northwestern lakes. The proper marks were to be placed in position by the Lighthouse Establishment as soon as it was notified by the department charged with construction or repair of pierheads that the work had been completed.

In 1874 Congress passed an act (18 Stat. L., 204, 220) extending the jurisdiction of the Lighthouse Board over the Mississippi, Missouri, and Ohio rivers and providing "for the establishment of such beacon-lights, day-beacons and buoys as may be neces-

[21] 1882, Vol. I, p. 27; 1883, Vol. I, p. 34; 1884, Vol. I, p. 47.
[22] 47 Cong. 1 sess., H. ex. doc. 1; also Treasury Doc. 395.

sary for the use of vessels navigating these streams." In accordance with this act the rivers were divided into two districts, officers assigned to each, and steps taken to determine the nature of the aids best adapted to river traffic. The first lights maintained by the United States in western rivers were established at Jefferson Barracks, near St. Louis, and at Twin Hollows, Missouri, in December, 1874.

Several severe wrecks occurred in Alaskan waters in the fall of 1883. The following spring the Board sent to Alaska, fourteen iron buoys and their appendages. These were placed in position by the naval officer in command of the United States ships on the Alaskan Station. These buoys were the first aids to navigation to be placed in Alaskan waters by the United States.[23] It was not until more than ten years later, in 1895, that the Lighthouse Service established the first light on the Alaskan Coasts.

On July 26, 1886 (24 Stat. L., 148), Congress authorized an increase in the number of lighthouse districts, making the total sixteen. When the several non-contiguous islands now governed by the United States were taken over, the jurisdiction of the Lighthouse Board was further extended so as to include the care of their lights.[24]

The act of May 14, 1908 (35 Stat. L., 160, 162), delegated to the Lighthouse Board the duty of caring for and maintaining the anchorage buoys previously placed by the United States in the harbors of New York and Philadelphia.

Transfer to the Department of Commerce and Labor. The act of February 14, 1903 (31 Stat. L., 826, 827), creating the Department of Commerce and Labor, transferred the Lighthouse Service from the Treasury to the new Department, and the Secretary of Commerce and Labor succeeded to the authority vested in the Secretary of the Treasury under existing legislation.

[23] Lighthouse Board, Annual Report, 1884, p. 10.

[24] The jurisdiction of the Lighthouse Service has been extended to non-contiguous territory as follows: Porto Rico and adjacent American waters, Act of April 12, 1900 (31 Stat. L., 77, 80); Hawaiian Islands, Executive Order, December 28, 1903; Guantanamo, Cuba, Executive Order, December 29, 1903; Midway Islands, Executive Order, December 8, 1904; Island of Guam, Executive Order, May 13, 1905; American Samoan Islands, Executive Order, July 3, 1905; American Virgin Islands, Executive Order, July 20, 1917.

Difficulties Involved in Board Administration. The Lighthouse Board by this time had been in existence for over fifty years. During this period it had put into commission numerous aids to navigation. The following table shows the increase in the number of aids maintained by the United States prior to the creation of the Lighthouse Board in 1852, and the number established during the Board's existence:[25]

	1790	1820	1850	1880	1910
Lights, other than minor	12	59	297	661	1,397
Lightships	..	1	35	31	54
Lighted buoys	..	..	..	..	225
Total lighted aids	12	60	332	1,523	3,992
Fog signals	1	3	49	194	457
Bell and whistle buoys (not lighted)	..	..	..	34	267
Other buoys	10	156	1,034	3,115	5,783
Total unlighted aids	11	159	1,083	3,343	6,507
Grand total including minor aids not given in detail above	45	249	1,536	5,221	11,661

In addition to carrying out some of the notable and difficult lighthouse construction of this country, the Board had instituted many important improvements in methods and equipment. The scheme of its organization, however, under which the general authority and direction was vested in a Board instead of in a single head proved to be defective. It was the exception to the prevailing system of organization for the performance of administrative work, and in operation it was found to be cumbersome, uneconomical, and inefficient. The main defects as pointed out by the Secretary of Commerce and Labor, Oscar Strauss, and by his successor, Charles Nagel, and also as recognized by the Board itself may be summarized as follows:[26]

[25] Adapted from table in Putnam, p. 52. Some of these figures are necessarily estimates, but for the purpose of indicating the general development of the service they are sufficiently accurate.

[26] Department of Commerce and Labor, Annual Reports, 1908, p. 70; 1909, p. 49.

The lack of an executive head with definite authority and responsibility.

The division of authority in each lighthouse district between the naval inspector, charged with the maintenance of aids to navigation, and the engineer officer, charged with the construction and repair; and the inevitable friction and increased cost that such a plan incurred.

The assigning of the responsible charge of the work to Army and Navy officers, whom it had become customary to detail for but brief terms to the Lighthouse Service.

Bureau of Lighthouses Created. Congress accordingly took up the matter of reorganization and on June 17, 1910, passed the act (36 Stat. L., 534) abolishing the Lighthouse Board and creating the Bureau of Lighthouses to have complete charge of the Service. This law, which is entitled "an act to authorize additional aids to navigation in the Light-house Establishment and to provide for a Bureau of Light-houses in the Department of Commerce and Labor,[27] and for other purposes," constitutes the organic act under which the Lighthouse Service is now operating.

Thus was provided the means for a more direct administration of the Lighthouse Establishment and a purely civilian personnel. It was thought, however, that it would be unwise to make a complete change of personnel at once; and the act accordingly provided that:

> The President may, for a period not exceeding three years from the taking effect of this section [July 1, 1910] assign army and navy officers to act in lieu of the appointment of civilian light-house inspectors, but such army and navy officers shall not receive any salary or compensation in addition to the salary or compensation they are entitled to as such army and navy officers: *Provided,* That in the districts which include the Mississippi River and its tributaries the President may designate army engineers to perform the duties of and act as inspectors. The President may detail officers of the Engineer Corps of the United States Army for consultation or repair of any aid to navigation authorized by Congress.

No changes were made in the district offices during the first year the law was in effect. During the second year, however,

[27] The act of March 4, 1913 (37 Stat. L., 736), creating the Department of Labor, provides: "That the Department of Commerce and Labor shall hereafter be called the Department of Commerce."

the reorganization of the Service was practically completed. The lighthouse districts were reconstituted and their number increased from sixteen to nineteen, the newly created districts being Alaska, Porto Rico, and the Hawaiian Islands. The work in each district was consolidated under a single officer, and, with the exception of the three river districts, civilian inspectors were put in charge of each.

The organic act called for the appointment by the President of four executive officers, a Commissioner of Lighthouses, a Deputy Commissioner, a Chief Constructing Engineer, and a Superintendent of Naval Construction. The former two took office on July 1, 1910, and the others in December of the same year. Mr. George R. Putnam was the first Commissioner to be appointed under the act, and he has since filled the position of head of the Lighthouse Service. The other officers are John S. Conway, Deputy Commissioner; H. B. Bowerman, Chief Constructing Engineer; and E. C. Gillette, Superintendent of Naval Construction.

The new act did not change the functions or activities of the Lighthouse Establishment. It was primarily interested in reorganizing the administration of the existing activities with a view to a more efficient and economic operation. The activities of the Bureau of Lighthouses remained, therefore, practically the same as they had been under the administration of the Lighthouse Board. The changes brought about in organization and management of the service, however, were of major importance.

The consolidation of the work in the lighthouse districts was one of the most important results of the new law. A single officer, the Lighthouse Inspector,[28] and a single organization in each district supplanted the existing two officers with their separate organizations of personnel and equipment. The program of work in each district was put under this officer and he was made directly responsible to headquarters in Washington. The result of this reorganization was a saving of personnel, a decrease in the expenditure for offices and clerks and a marked decrease in the use of lighthouse tenders. Five such vessels were sold in the year 1911 as

[28] The act of June 20, 1918 (40 Stat. L., 607, 608), changed the title of Lighthouse Inspector to "Superintendent of Lighthouses."

being unnecessary under the new system. Publications and methods of work were simplified, and various economies were effected.

Other administrative changes were instituted. During the fiscal year 1912 a uniform system of inspection was installed. The work of the several lighthouse districts was inspected by the General Inspector as regards the operation of the vessels and technical matters in general, and by the Examiner as to business methods, property accounts, and clerical organization. Reports were made to the Bureau in Washington and such portions as called for action by the Superintendents were subsequently referred to the various districts. At this time, also, a system of cost-keeping and reporting was introduced to show the cost of maintenance (operation), repairs, and improvements of all aids to navigation. The methods of keeping the general accounts in both the Bureau and district offices were also revised. The resulting uniformity in methods of control integrated the Service and facilitated the maintenance of vessels and other equipment at a proper standard.

During its fifteen years of existence the Bureau of Lighthouses has continued to operate as a centralized agency of control. In 1914 a conference of lighthouse inspectors was held for the first time in the history of the Service. At this conference there was general discussion of administrative methods, construction work, aids to navigation, apparatus and equipment, vessels, etc. Similar conferences were held annually until the World War and again beginning in 1920. These meetings have afforded the Superintendents an unusual opportunity for the interchange of ideas and methods, and have promoted the uniform operation of the Service.

Special attention has been paid by the Bureau to the improvement of aids to navigation. By taking advantage of the scientific discoveries and advances made in the fields of electrical and radio engineering, it has been able to adapt changes in method to the existing aids, and to apply newly evolved principles to the establishment of more effective light and sound producing devices. It has been the practice to substitute, wherever practicable, the automatic light for the lights requiring constant attending. This had resulted by the end of the fiscal year 1925, in the installation of 993 automatic lights on fixed structures. This is in addition to the 723 gas buoys on station at that time. The following table

shows the increase in the total number and in the improved types of aids effected by the Bureau from June 30, 1910, to June 30, 1925:

Class	June 30, 1910	June 30, 1925	Increase
Automatic lights on fixed structures	96	993	897
Lighthouses equipped with oil-vapor lamps	80	285	205
Flashing lights (including buoys)	515	1,934	1,419
Gas buoys	225	723	498
Radio fog signals	...	13	13
Fog signals (not including radio or buoy)	540	596	56
Whistling and bell buoys (unlighted)	303	331	28
Aids to navigation (total number)	11,713	17,864	6,151

The increases shown in the above table are net increases. The figures do not take into account the number of aids discontinued during the period. Including these amounts, the gross number of aids established by the Bureau of Lighthouses to the end of the fiscal year 1925 was 13,868.

The following is a list of the more important aids to navigation put into operation since 1910, showing years of completion:[29]

Cape Hinchinbrook, Alaska, light and fog signal station.... 1910
White Shoal, Lake Michigan, light and fog signal station.. 1910
Rock of Ages, Lake Superior, light and fog signal station.. 1910
Split Rock, Lake Superior, light and fog signal station.... 1910
North Manitou Shoal, Lake Michigan, light vessel..... 1910
Milwaukee, light vessel..... 1912
Livingstone Channel lighting system, Detroit River..... 1912
Punta Gorda, Calif., light and fog signal station..... 1912
Staten Island, light station..... 1912
Miah Maull, Delaware River, light and fog signal station... 1913
Superior Entry, Lake Superior, light and fog signal station. 1913
Alki Point, Wash., light and fog signal station..... 1913
San Pedro, Breakwater, Calif., light and fog signal station.. 1913
Kilauea Point, Hawaii, light station..... 1913
Rondout Creek, Hudson River, light and fog signal station. 1915
Point au Fer Reef, La., light and fog signal station..... 1916
Cape St. Elias, Alaska, light and fog signal station..... 1917
Navassa Island, West Indies, light station..... 1917

[29] Annual Reports, 1920-1925, inclusive.

Sand Hills, Lake Superior, light and fog signal station.... 1919
Lorain Harbor, Ohio, light and fog signal station..... 1919
Lime Kiln, Wash., light and fog signal station..... 1919
Caribbean Sea, reef lights..... 1919
Galveston Jetty, light and fog-signal station..... 1920
East River, N. Y., light station..... 1921
South Pass Jetty, La., light and fog signal station..... 1921
Keweenaw Waterway, Mich., system of lights..... 1921
Nantucket Harbor, electrically operated fog signal..... 1923
Florida Reefs, Fla., two light stations..... 1923
Sabine Pass Jetty, La., light station..... 1924
Raritan Bay and connected waterways, N. Y., and N. J., new aids 1925

A list of important stations entirely rebuilt with the year of completion follows:

Lloyds Harbor, N. Y., light and fog signal station..... 1912
Buffalo, N. Y., light and fog signal station..... 1914
Brandywine Shoal, Delaware River, light and fog signal station 1914
Thimble Shoal, Va., light and fog signal station..... 1914
Ashland Breakwater, Wis., light and fog signal station.... 1916
Manitowoc, Wis., light and fog signal station..... 1920
Mississippi River, 25 lights rebuilt..... 1922
Pt. Borinquen, P. R., light station..... 1924

Special attention has also been paid to the establishment of a more complete system of aids to navigation in Alaska. The need was early recognized by the officers of the Bureau.[30] On August 1, 1910, Alaska was made a separate lighthouse district, and a district office and depot were established at Ketchikan, from which to direct operations. From the 160 aids maintained in Alaska at that time, the number had increased to 732 by the end of the fiscal year 1925. The increases by type of aid and by years from 1915 are as shown in the table on the opposite page.[31]

War Activities. Prior to the World War there were no legal provisions governing the participation of the lighthouse organization in military or naval operations. Nevertheless, throughout its history the Service has played an important part in the different

[30] Annual Report, 1911, p. 12.
[31] *Ibid.*, 1925, p. 3.

wars engaged in by this country. Its work in the Civil War has already been commented upon.

During the Spanish-American War much of the lighthouse equipment and personnel was used for military purposes. Several of the tenders were transferred to the Navy Department. Of these, the Mayflower, Maple, Mangrove, and Armeria rendered active service; the Armeria as an ammunition supply vessel during operations in the West Indies. The tenders also rendered assistance on dispatch duty and in planting and protecting submarine defenses in several important harbors. These vessels were particularly well equipped for handling buoys, moorings, etc., and their officers were thoroughly familiar with the coast line. For

Aids	1910	1915	1920	1921	1922	1923	1924	1925
Lights	37	112	196	206	210	227	244	260
Gas buoys	...	...	10	13	14	14	16	19
Fog signals	9	10	11	11	11	11	12	13
Buoys	84	167	224	225	225	271	274	303
Day marks	30	49	94	93	124	127	128	137
Total	160	338	535	548	584	650	674	732

this reason they were especially suited for laying and removing submarine mines and other defenses.

For several years prior to 1916, informal arrangements were in effect with the War Department for the assignment from time to time, of lighthouse tenders for mine-planting practice. The Service was at all times prepared in the event of necessity, to turn over to the Navy Department, such vessels as might be required in naval operations.

The mobilization of the Lighthouse Service in time of war was provided for in the naval appropriations act of August 29, 1916 (39 Stat. L., 556, 602). This act provided that:

The President is hereby authorized, whenever in his judgment a sufficient national emergency exists, to transfer to the service and jurisdiction of the Navy Department, or of the War Department, such vessels, equipment, stations and personnel of the Lighthouse Service as he may deem to the best interest of the country, and after such transfer all expenses connected therewith shall

be defrayed out of the appropriations for the department to which transfer is made; *Provided,* That such vessels, equipment, stations, and personnel shall be returned to the Lighthouse Service when such national emergency ceases in the opinion of the President, and nothing in this Act shall be construed as transferring the Lighthouse Service or any of its functions from the Department of Commerce except in time of national emergency and to the extent herein provided: *Provided further,* That any of the personnel of the Lighthouse Service who may be transferred as herein provided shall, while under the jurisdiction of the Navy Department or War Department, be subject to the laws, regulations, and orders for the government of the Navy or Army, as the case may be, in so far as the same may be applicable to persons whose retention permanently in the military service of the United States is not contemplated by law.

The Secretary of the Navy, the Secretary of War, and the Secretary of Commerce shall jointly prescribe regulations governing the duties to be performed by the Lighthouse Service in time of war, and for the coöperation of that service with the Navy and War Departments in time of peace in preparation for its duties in war, and this may include arrangements for a direct line of communication between the officers or bureaus of the Navy and War Departments and the Bureau of Lighthouses to provide for immediate action on all communications from these departments.

At the outbreak of the World War the President, in accordance with the above act, issued an executive order transferring thirty lighthouse tenders to the War Department and fifteen lighthouse tenders, four lightships, and twenty-one light stations to the Navy Department.[32] The tenders transferred to the War Department were subsequently assigned to the Navy Department. On January 31, 1918, another lighthouse tender was transferred, making a total of fifty vessels and 1132 persons. These vessels were effectively used by the War Department in mine-planting operations and by the Navy Department in laying submarine defense nets during the war and in removing these defenses after the war. They placed practice targets, buoys to mark wrecks of torpedoed vessels and other marks for military purposes; they were employed on patrols and on special duty.

In addition to the work done directly under the orders of the military establishment, the Service provided facilities at the vari-

[32] Executive Order of April 11, 1917.

ous depots for the berthing of naval vessels. At several stations necessary repairs were made to naval patrol boats. Additional buoys were placed and other changes in aids to navigation were made as required. In some instances buoys, moorings, and other appurtenances were transferred to or purchased for the Navy and War departments. At the general lighthouse depot at Staten Island, New York, special coaling facilities were provided as well as quarters for naval detachments. While performing these diverse military duties, the vessels and stations continued their regular work of operating and maintaining aids to navigation.

The Lighthouse Service also coöperated in other ways in prosecuting the war-time activities of the government. Together with the Treasury and Navy departments it helped improve the coastal communication facilities by telephone and radio, and through the transmission of reports received from the light stations and considered of possible military importance. The annual report for 1918[28] lists the following miscellaneous war-time duties performed by the service: Various investigations were made at the request of the Department of Justice and the Military and Naval information services; officers of the Marine Engineering Division of the Lighthouse Service assisted the Shipping Board in various matters respecting the design and sea trials of various types of vessels, including concrete ships; an officer of the Service was engaged in the work of the chain section of the War Industries Board, having to do with the standardization and allocation of iron and steel chains for the different activities of the government; a scientific expert of the Lighthouse Service assisted one of the naval technical boards; and the Commissioner of Lighthouses acted as the representative of the Department of Commerce on the New York Wage Adjustment Board.

[28] Page 4.

CHAPTER II

ACTIVITIES

The Lighthouse Service operates aids to navigation along the coast line and river channel of the United States and its dependencies.[1] Its jurisdiction extends over the Atlantic, Gulf, and Pacific Coasts, the Great Lakes, interior rivers,[2] Alaska, Porto Rico, Hawaii and all other territory under the control of the United States, with the exception of the Philippine Islands and Panama. In the Panama Canal Zone the canal government has

1

Coast line and river channel under the jurisdiction of the Lighthouse Service	General coast line	Detailed coast or channel line
	Statute miles	*Statute miles*
Atlantic and Gulf coasts of the United States	3,500	10,000
Porto Rico, Virgin Islands, Guantanamo, and other United States possessions in the West Indies	370	450
Pacific coast of the United States	1,400	2,900
Alaska	6,600	15,000
Hawaiian and Midway Islands, Guam, and American Samoa	950	1,200
Great Lakes and connecting waters, United States portion	2,500	3,200
Coastal rivers (Atlantic and Gulf coasts, 1,470 miles; Pacific coast, 240 miles)	....	1,710
Interior rivers (Mississippi River, 1,940 miles; Ohio River, 970 miles; Missouri River, 390 miles; Yukon River and tributaries, 1,700 miles; other rivers, 1,120 miles)	....	6,120
Total	15,320	40,580

"General coast line" measured by steps of 30 statute miles.
"Detailed coast line" measured by steps of 3 statute miles.—From Conway, The U. S. Lighthouse service, p. 3.

[2] The jurisdiction of the Service over rivers not included in tidewater navigation is restricted to those specifically named by acts of Congress; these now include practically all the important navigable rivers of the country.

charge of the lighting of the canal and approaches.[3] In the Philippines the lighthouse work is carried on by the insular government and supported entirely out of the revenues of the Islands. The aids at Guantanamo, Cuba, the American Samoan Islands, and the Island of Guam, while under the jurisdiction of the Bureau of Lighthouses, are operated and maintained under the direct supervision of the naval commandants. They are supported under allotments made from appropriations to the Lighthouse Service.

The Bureau also supervises the establishment and operation of private aids to navigation, the lighting of bridges over navigable waters in the United States, and the marking of wrecks.

In one instance the United States assists in the upkeep of a light over which the Bureau of Lighthouses exercises no control. This light is situated at Cape Spartel, Morocco, and is maintained in accordance with the joint convention between Morocco and the United States, Austria, Belgium, Spain, France, Great Britain, Italy, The Netherlands, Portugal, and Sweden, in force since March 12, 1867. This lighthouse was erected at the expense of the Moroccan Government, but is maintained by the other contracting nations. The annual appropriation by the United States for this purpose is $386.

The work of the Bureau of Lighthouses is unifunctional in character. Its single duty is the maintenance and operation of aids to navigation along the coasts and river channels of the United States and its dependencies. The organic act of 1910, in describing the duties of the Commissioner of Lighthouses, states in the most concise form the functions of the Lighthouse Establishment itself. Section 7 provides that

> the commissioner of light-houses shall, under the direction and control of the Secretary of Commerce . . . have charge and control of the construction, maintenance, repair, illumination, inspection, and superintendence of light-house depots, supply stations, light and signal stations, light-houses, light-vessels, light-house tenders, fog signals, submarine signals, beacons, buoys, day marks, post-lantern lights and seamarks and their appendages, and generally of the Lighthouse Service. . . .

[3] See Institute for Government Research, The Administrative Establishment of the Panama Canal. Service Monograph.

"It will be seen from the foregoing that the Bureau of Lighthouses is a strictly unifunctional service—that of maintaining stations, lights, buoys, etc., to mark channels, indicate obstructions to navigation, and thus assist mariners in the navigation of their vessels."[4] In performing this function, however, the Lighthouse Establishment engages in many and varied activities. These activities may conveniently be grouped under the following main heads:

Installation of new aids
Operation of aids to navigation, including lighting of rivers
Research and manufacture
Supervisory duties
Coöperation with other services

Installation of New Aids to Navigation. When a request for a new lighthouse is made of the Bureau of Lighthouses it is turned over to the Superintendent of the district in which the aid is desired. The Superintendent makes a preliminary survey and submits his report to the Commissioner. If the report is favorable the District Superintendent is instructed to make a preliminary survey to determine the kind of station required and the data for an estimate of the cost. The survey report and estimate are then reviewed by the Bureau officers and a request made of Congress for the necessary appropriation. If funds are provided, the District Superintendent makes a detailed survey, and draws up systematic plans for the new structure. These plans are reviewed by the officers in the Bureau and returned to the district office. The Superintendent recommends whether the construction can better be done by contract or whether it is more expedient to use the district field force.

As far as possible new aids to navigation are constructed by contract under the direct supervision of the Service. The works are inspected during construction and after completion, both as to material and workmanship. In all cases, however, both for marine equipment and for land structures, the plans and specifications are prepared by the Lighthouse Service itself. This is necessary because of the unusual engineering and architectural peculiarities involved in lighthouse construction.

[4] President's message submitting report of Commission on Economy and Efficiency, 62 Cong., H. ex. doc. 670, p. 139.

The more important items of construction completed during the fiscal year 1925 were: Riprap protection for various light stations in the second, third, and fifth districts; establishing and improving aids to navigation in Raritan Bay and connected waters, New York and New Jersey; riprap protection for West Breakwater Pierhead Lighthouse, Ashtabula Harbor, Ohio, and improving aids to navigation, Conneaut Harbor, Ohio, and Erie Harbor, Pennsylvania; placing a belt of steel plating around the concrete piers at Stannard Rock Lighthouse, Lake Superior, Michigan; establishing seventy-two aids to navigation in Alaska; installing electrically operated fog bell on the jetty at the entrance of Coquille River, Oregon.

Engineering Construction. Where it is impossible to interest contractors, whether because of the remoteness of the station or because of the hazards involved, the actual building is undertaken by the Service itself. In such cases the Service buys the materials and hires the labor, acting as its own contractor. Generally these cases have arisen either in Alaska or Hawaii.

Some of the more important construction works that have been carried on directly by the Service during recent years are: Erection of Cape Spencer Light, Alaska; rebuilding of piers, Spectacle Reef and Stannard Rock, Lake Michigan; rearrangement of lights and fog signals, Grays Harbor, Washington; and installation of riprap protection for the lighthouses of the third district.

Operation of Aids. On June 30, 1925, the Lighthouse Service maintained a total of 17,864 aids to navigation, including lighthouses, lightships, buoys of all kinds, and fog signals.[5] The table on page 32 shows the aids established and discontinued during the fiscal year 1925 and the total number of aids of each class in operation at the close of the year.[6]

[5] This figure includes the aids maintained by contract. See Table 9, Appendix 6.

[6] Annual Report, 1925, p. 2. The aids to navigation will be described at greater length under the discussion of the operation of the different aids. For a detailed technical exposition of the aids to navigation, see Putnam, Lighthouses and lightships of the United States, and Conway, The United States Lighthouse Service.

The aids designated as "lights (other than minor)" include major lights classified under the Fresnel system of orders, range lenses, reflectors, and lens lanterns.

Lightships are vessels equipped with lights, submarine bell and fog signal equipment, and wireless apparatus, and moored in places where it would be impracticable to erect fixed structures.

Class	1925				Total, June 30	
	Established	Discontinued	Increase	Decrease	1924[a]	1925
Lighted aids:						
Lights (other than minor)	47	41	6	...	1,951	1,951
Lightship stations	...	1	...	1	47	46
Gas buoys	41	38	3	...	453	456
Gas buoys, with whistles and bells	21	9	12	...	255	267
Minor lights	473	252	221	...	3,230	3,451
Float lights	15	17	...	2	176	174
Total lighted aids	597	358	239	...	6,112	6,351
Fog signals:						
Radio	2	...	2	...	11	13
Sound fog signals (air)	17	14	3	...	546	549
Submarine fog signals	...	1	...	1	48	47
Gas buoys, with whistles and bells	21	9	12	...	255	267
Whistling buoys, unlighted	5	2	3	...	80	83
Bell buoys, unlighted	10	6	4	...	244	248
Total fog signals	55	32	23	...	1,184	1,207
Unlighted aids:						
Buoys	340	221	119	...	7,375	7,494
Day beacons	302	90	212	...	2,867	3,079
Total	642	311	331	...	10,242	10,573
Grand total[b]	1,273	692	581	...	17,283	17,864

[a] Differences from statistics published in 1924 report are due to minor discrepancies in previous count.
[b] Gas buoys with whistles and bells are counted only once in the grand total.

Gas buoys are special types of buoys equipped with automatic lights. They are used to mark important shoals or channels and generally as guides to navigation.

Gas buoys, with whistles and bells, are combinations of the above with the attachment of whistles and bells which automatically produce sounds for warning in fog.

Minor lights include post lights and small lights generally. They are frequently used for river lighting.

Float lights are, as a rule, small lights borne on a float or raft. They are maintained on stations not sufficiently important to warrant a fixed beacon and where they are more satisfactory than lighted buoys.

Radio fog signals are devices for sending definite automatic signals which may be received by the radio compass or direction finder on vessels, enabling mariners to obtain bearings in foggy weather. These aids are located at light stations and lightships.

Sound fog signals (air) consist of bells, reed horns, steam and air whistles, diaphones, and sirens.

Submarine fog signals are bells operated under water in periods of fog.

Whistling buoys, unlighted, are combination buoy and fog signals, the latter being operated by the motion of the buoy in the water.

Bell buoys, unlighted, are similar to the last named above with the substitution of a bell, for producing the warning in fog, instead of a whistle.

The term " buoys " under the heading " unlighted aids," includes those described as cans, nuns, and spars of various types. They are used extensively throughout the lighthouse system but more frequently to mark channels and inside waters.

Day beacons are minor fixed aids not bearing a light. They usually consist of posts or spindles, with a target or some other object of a distinctive shape and color.

Light Stations Proper. Light stations proper are maintained at locations where the traffic is of sufficient extent to warrant the expenditure, and where satisfactory results could not be obtained by the use of " minor lights "alone. The type of structure adopted for lighthouses depends in each case on the importance of the light and on the foundation conditions. At some of the stations a single structure serves as a combined light tower and keeper's dwelling. For the more important lights, however, the tower is detached. Most of the older detached towers are built of brick or stone masonry, with stairways, lantern, and other appurtenances of cast iron. Later installations are structural open framework of wrought iron or steel, with an inclosed stairway in the center. In recent years the towers have been built of reinforced concrete.

The earliest type of lighting apparatus consisted of an open coal or wood fire with other inflammables, such as pitch, burned on top of the tower. The early lights in this country were equipped with an oil burner and used either fish or whale oil as the illuminant. The Argand lamp with the reflector and "lens or magnifier" was the next development. It appears that, in the beginning, these lamps had several objectionable features. Improvements were gradually made, however, both in the lamp and in the lantern: the lantern "by making the frames lighter, the panes larger, and by providing more adequate ventilation. To provide illumination all around the horizon, sets of 8 to 20 lamps were used, placed side by side around the circumference of a circle. This arrangement, in its most complete form, is designated as the catoptric or reflector system. . . ."[1]

In 1841 the Fresnel or lens apparatus was given a trial use at the Navesink Light, New Jersey. Immediately after the Lighthouse Board came into existence it began installing this lenticular apparatus generally throughout the service, and by 1859 the substitution was practically completed. The Fresnel apparatus consists of a polyzonal lens inclosing the lamp, which is placed at the central focus. The lens is built up of glass prisms in panels, the central portions of which are dioptric, or refracting only, and the upper and lower portions both reflecting and refracting, or catadioptric. "The advantages of this system lie in the greater brilliancy, owing to the fact that a large proportion of the light given out by the source is concentrated by the prisms into beams useful to the mariner, and the consequent economy in the consumption of oil or other illuminant used."[1] The Fresnel lenses are classified into six orders, depending on the focal length of the lens; that is, the distance from the center of the light to the inner surface of the lens, as follows:

First Order	36.2 inches
Second Order	27.6 "
Third Order	19.7 "
Third and a half Order	14.7 "
Fourth Order	9.8 "
Fifth Order	7.4 "
Sixth Order	5.9 "

[1] Conway, p. 30.

Other lights maintained by the Service include reflectors, which are used primarily to mark the axes or center lines of channels. For ranges two lights are employed, placed a proper distance apart with the rear light higher than the front one. This makes both lights show in the same vertical plane when the navigator is in the center of the channel. Reflectors are either improved forms of glass lenses with prismatic glass reflectors back of the light source or lights similar to the headlights of locomotives. The former are known as range lenses.

The changes and improvements brought about in the lighting apparatus have resulted in corresponding changes in the illuminants employed. Sperm oil was the leading illuminant for some years, then rapeseed oil, and later lard oil. In 1877 kerosene came into use. It soon became the chief illuminant, and it has remained such to the present time. The incandescent oil-vapor lamp, now generally employed at important lights, burns kerosene under an incandescent mantle.

In the earlier periods most of the stations were characterized by fixed lights. In order to avoid the confusion between lights, the attempt is now made to give the lights distinctive characteristics. At the more important stations the lights are equipped for "flashing" or "occulting." These terms refer to the relative duration of light and darkness, a flash being an interval shorter than the duration of an eclipse, and an occultation being shorter than, or equal to, the duration of the light. Further diversification is obtained by the use of red screens, changing the color from white to red in various combinations; these lights are known as alternating.[8]

Lightships. Lightships are maintained by the Service at locations off the coasts where it would be impracticable or needlessly expensive to build lighthouses. A few of the stations are placed on inside waters, but in most instances they are used to mark the approaches to ports or bays or the outer limits of off-lying dangers. Lightships are employed because of their particular value in providing both the lights and the fog signal which may be approached close to, thus enabling mariners to fix their positions with reason-

[8] Table 2, Appendix 4, gives the characteristics of the lights in commission on June 30, 1925.

able certainty. In this respect they are superior to lighthouses, where as a general rule due allowance must be made for a safe distance in passage. In addition the mobility of lightships makes possible the shifting of stations to meet various conditions of traffic, such as changes in shoals or channels, the use of deeper draft vessels, or other contingencies. They may also be placed in locations where it is impossible to build a lighthouse.

The first lightship was established in 1820, at the entrance to the Elizabeth River, near Norfolk. Four other lightships were placed in Chesapeake Bay in the following year, including one off Willoughby Spit, at the entrance to Hampton Roads. Three years later the first outside lightship was moored seven miles off Sandy Hook. When the Lighthouse Board came into existence in 1852, there were thirty-eight lightships in the service. Most of these were in inside waters, and the Board replaced them by permanent lighthouse structures. In 1882 the first iron lightship was constructed; prior to that time wooden construction had been the practice. Shortly afterwards the use of propelling machinery was introduced, enabling the lightships to proceed to and from their stations under their own power, and assisting them in maintaining position in heavy weather.

The construction of lightships presents a peculiar and complex problem in naval architecture. Certain requirements—steadiness and ease of motion—are prerequisite to the general efficiency of the light. The plans and specifications are prepared in the Bureau.

The illuminating and fog signal apparatus on board the lightships has developed materially from the ordinary ships' lanterns and hand bells at first used. The lens light is in general use to-day. The vessels are equipped with steel masts, each mast surmounted by a gallery and a rail, with a lens lantern secured at the top of the masthead. Either acetylene or electricity is used as the illuminant, and each light has a definite flashing characteristic. The fog signals now in use are essentially the same as those employed at land stations. Lightships are distinguishable in daytime by their unusual shape and rig and by their characteristic painting and lettering.

During the fiscal year 1925 the Service operated lightships on forty-seven stations. For this purpose it maintained sixty vessels, of which thirteen were relief vessels. The latter are used to re-

place vessels that are temporarily off their stations, either for purpose of overhaul or because they are disabled. In 1925 the lightships averaged 263 days on station per vessel.

The act of June 5, 1920 (40 Stat. L., 1057), authorized $5,000,000 for the construction of vessels for the Lighthouse Service, but no appropriations were made available that year. The sundry civil appropriation act of March 4, 1921 (41 Stat. L., 1367, 1416), provided $1,000,000 for building "lighthouse vessels for general service." Contracts were placed for the construction of five vessels at an average price of $184,000. These vessels were completed during the fiscal year 1924 and placed in commission as lightships, either on permanent station or on relief duty.

Fog Signals. Important light stations and lightships are equipped with fog signals, which are started as soon as signs of fog are observed. Due to aberration in the transmission of sound, mariners are warned not to rely too much on the warning of the fog signals, but to regard it only as an auxiliary aid. The distribution of fog signals along the coasts conforms to the needs imposed by fog conditions. The Service on June 30, 1925, maintained 543 fog signal stations, of which more than half were located along the Atlantic Coast from Cape Lookout, northward.

Various types of fog signals have been used by the Lighthouse Service. The first signal was a cannon installed at Boston Light in 1719. This was fired when necessary to answer the signals of ships in thick or foggy weather. Bells were introduced at an early date. At first they were small and rung by hand. Later, striking mechanisms operated by clockwork were developed. Many bells are now in use, ranging from small hand bells to bells 4000 pounds in weight. They are mostly located in inside waters, harbors, etc.

Later developments were the trumpets, operated by compressed air; steam whistles, first installed in 1857; and the sirens, first put into operation at Sandy Hook, East Beacon, in 1868. The steam and air whistles and sirens have been greatly modified and are now extensively employed. Other fog signals have been introduced, including electrically operated sirens, bells, and gongs. Submarine signals, consisting of specially designed bells submerged sufficiently to avoid wave disturbances, have been introduced in recent years. The most recent fog signal to be perfected is the radio fog signal.

Radio Fog Signals. At the close of the fiscal year 1925 the Bureau operated radio fog signals at thirteen stations, eleven at lightships and two at light stations. The first radio fog signals in the United States were placed in commission at Ambrose Channel Lightship, New Jersey; Fire Island Lightship, New York; and Sea Girt Light Station, New Jersey, on May 1, 1921. These radio beacons have been in operation without interruption since that date.

The transmitting apparatus in use is a commercial panel type spark transmitting set of about one kilowatt power. In addition to this set, a special automatic motor-driven timing signal, for producing the desired signal at regular intervals, is provided. The antennæ at the transmitting stations are the same as used for ordinary radio communication.[9]

The system of navigation by radio direction signals is based on the installation at selected lighthouses and lightships along the coasts of apparatus for sending radio signals of simple and definite characteristics. From these signals the navigator of any vessel equipped with a radio compass can, during the continuation of fog or heavy weather, take definite bearings to guide or to locate his ship, although no object is visible. This system affords, for the first time in navigation, a practicable means by which the navigator can take reasonably accurate bearings on fixed beacons which are not visible.

The most valuable use of the radio fog signal is probably "as a leading mark, as, for example, to make a lightship anchored in the approach to a harbor or to pass outside of a lightship anchored to guard against dangers off the coast."[10] The navigator is also able, as he is in using visible objects, "to locate his ship by cross bearings on two or more radio stations or by repeated bearings on the same station with the distance logged between the bearings, or by a single bearing and dead reckoning."[10]

Since the first installations in 1921, a gradual development of the system has been taking place. During the fiscal year 1922

[9] For detailed discussion of the system of navigation by radio direction signals see: Putnam, Radio fog signals and their use in navigation in connection with the radiocompass.

[10] Annual Report, 1921, p. 24.

radio fog signal equipment was placed on San Francisco Lightship. In 1923 stations were established at Cape Henry Light Station, Virginia, Diamond Shoal Lightship, North Carolina, and Blunts Reef Lightship, California; in 1924, they were placed in operation at Boston Lightship, Nantucket Shoals Lightship, Swiftsure Bank Lightship, Washington, and Columbia River Lightship, and in 1925 at Five Fathom Bank Lightship, New Jersey, and Lake Huron Lightship, Michigan. In addition to the above, there were on June 30, 1925, fifteen radio fog signal stations in progress of installation, most of them at light stations.

Of the future development of radio aids to navigation, Mr. Putnam, the Commissioner of Lighthouses says:

> As a result of widespread interest and investigation, as well as service experience, there will doubtless be improvements in the systems in use, and also other applications of radio signalling for the safeguarding of navigation. It is not probable, however, that as a result of anything now in sight the extensive system of sound fog signals, such as sirens, whistles, horns, and bells, can be dispensed with, as these are of great value to vessels and boats of every size and description, many of which are not likely soon to be equipped for receiving radio signals. . . .[11]
>
> It may be desirable to develop this system for the location of vessels in clear weather, at distances beyond the visibility of lights or other objects on land, and this may readily be done if sufficiently useful.[12]

Buoys. Buoys are employed to mark shoals or other obstructions, to indicate the approaches to, and limits of, channels or the fairway passage through a channel, and in some cases to define anchorage grounds. They are extremely useful aids, as they may be put in critical positions where it would not be feasible to erect a fixed light or beacon. They are, however, subject to the disadvantage that they may be torn from their moorings, dragged out of positions, or sunk on their stations.

Buoys were among the earliest aids operated by the Lighthouse Establishment. The earlier types were either solid wooden spars or built up in various shapes of wooden staves, like barrels. They

[11] Putnam, Radio fog signals, p. 26.

[12] Annual Report, 1921, p. 31. This is now being done; Nantucket Lightship radio fog signal is operated fifteen minutes of every hour in clear weather.

were painted red, white, or black, without any special system. In 1850 Congress passed an act (9 Stat. L., 500, 504) providing for a systematic coloring and numbering of all buoys. The same act provided for "an iron can buoy" to be placed at Little Egg Harbor, New Jersey. It is probable that iron buoys were first put into actual service about that time. The buoys in use to-day are nun or can buoys of iron, and spar buoys of wood or iron. The iron buoys are placed at the more important points on account of their superior visibility. To aid further in distinguishing their positions, the portion above the water is made in two different shapes.

For warning in fog or mist, buoys are fitted with bells, whistles, and submarine bells, all operated by the motion of the sea. The bell buoys were introduced in 1855 and replaced the expensive and unsatisfactory bell boats then in use. Bell buoys respond to the slightest motion of the waves and are used especially in harbors and inside waters where a sound signal is desired. On June 30, 1925, there were 248 unlighted bell buoys in operation.

Whistling buoys were first introduced in 1876; there are now eighty-three of these buoys in service. As in the case of the bell buoy, the sound produced by the whistling buoy is automatic, depending on the motion of the waves. Whistling buoys are, therefore, more efficient in rough outside waters, and are placed at the most important outside points where sound signals are considered desirable.

In addition to the "unlighted buoys" the Service operates lighted or gas buoys. This type of buoy is a comparatively modern aid, having been first introduced in April, 1884. Electric buoys, operated by cable from the shore, were established a few years later, but were discontinued in 1903 after many mishaps, due largely to the breaking of cable. All of the lighted buoys now operated use compressed gas, either oil gas or acetylene. Many gas buoys are provided with some form of sound-producing device, such as a bell or a whistle, and in a few cases, both. These are known as combination gas and bell buoys, or combination gas and whistling buoys, and perform the work of the two. On June 30, 1925, there were in operation 267 aids of this class. Gas buoys have proved to be valuable aids, and at times have obviated the necessity for maintaining a lighthouse or lightship.

River Lighting. The lighting of rivers was first authorized by the act of June 23, 1874 (18 Stat. L., 217, 220). This act extended the jurisdiction of the Lighthouse Board over the Mississippi, Missouri, and Ohio rivers, and provided " for the establishment of such beacon-lights, day-beacons and buoys as may be necessary for the use of vessels navigating these streams." The lighting of non-tidal rivers is limited to those which have been specifically authorized by law. By the passage of a series of acts, however, Congress has increased the jurisdiction of the Lighthouse Service so as to embrace practically all of the important streams and some of the important interior lakes of the country.[13]

Three districts, the thirteenth, fourteenth, and fifteenth, are engaged entirely in the lighting of the Mississippi river and its principal tributaries. The problems presented by these districts differ considerably from that found in the Lake and Coast districts. As pointed out in the following chapter, the Superintendents in charge of these districts are officers of the Corps of Engineers, and are usually at the same time in charge of the river improvements under the War Department.

The channels of these rivers generally follow the concave banks, with crossings where the concavity shifts from one side of the river to the other, and the lights are located so as to show the general shapes of the bends and the positions of the crossings. The lights are usually placed on the banks of the rivers and the crossings marked by two range lights, one ahead and the other astern. Where the crossing is crooked it is sometimes necessary to have a series of range lights, and during low water some of the lights are placed on sand bars or on small floats or rafts. The latter are known as float lights. Due to the shifting of river channels, the locations of the river lights are often changed.

The lights in these three districts are simple in character, and are generally known as post lights. In some cases they consist of an ordinary 14-inch hand lantern, inclosed in a square or triangular tin case with plain glazed sides. There is also a specially designed post lantern with a one-inch flat wick and a pressed glass lens about eight inches in diameter. These lights burn kerosene and as a rule are fixed white in character, although some are fitted with red globes or shades. The most complete type of structure on which post lights are placed consists of a post with braces and

[13] See page 105.

steps, with a lantern on top. Wings are attached to make an appropriate day mark. On account of changes in the channels, caving banks, and for other reasons it is often necessary to shift the position of these lights. For this reason many of the structures are of a temporary character. In some localities the lights are attached to trees. In the more narrow and crooked channels or where the ends of wing dams are to be marked, a special type of buoy has been found desirable. The buoy best adapted to fulfill the conditions peculiar to these waters is one having but a slight reserve buoyancy, so that drift and other floating objects coming in contact with it pass over without displacing it.

The river lights are cared for by persons living in the neighborhood. The work requires but a part of their time, and they are paid on the basis of the number of lights tended. In most cases a number of lights are cared for by one person, who usually uses a boat to reach them.

At the present time extensive systems of lights and other aids to navigation are maintained on several of the rivers outside of the three river districts. Among these are the Hudson, Delaware, Potomac, James, Savannah, St. Johns, and Columbia rivers. On some of them regular fog signals and range lights are operated.

Repair and Maintenance. All repairs and upkeep of the aids to navigation are done directly by the Lighthouse Service. Wherever feasible the work is done in the field, at the location of the aids. Whenever necessary, the equipment is removed and taken to the district shops, where the major repair work is done. All painting and application of washes to structures at light stations, as well as repairs and improvements required in the ordinary preservation and maintenance of buildings and stations, are done by the keepers at the stations so far as practicable. Extensive repairs and alterations at stations are done by the field force under the direct supervision of the District Superintendent.

For the purpose of aiding in the work of maintenance and repair, the Service employs fifty-six lighthouse tenders. These tenders attend to the buoyage and assist in transporting supplies and repair materials as well as construction and repair forces to the different stations. They also furnish transportation to the officers of the Service while on inspection duty. During the fiscal year 1925 the tenders steamed a total of 473,759 nautical miles, or approximately 8773 miles for each tender.

The lightships are docked for repairs at regular intervals. Special regulations govern the removal of vessels from active service for the purpose of repair, and the Superintendent of each district is responsible for the enforcement of these regulations.[14]

Research and Manufacture. Much of the special apparatus used by the Lighthouse Service has been perfected and manufactured by the Service itself. At its depot on Staten Island, New York, the Service maintains various shops. These shops are employed chiefly in the manufacture and repair of special equipment, much of which cannot be obtained from regular dealers at an economical price. In recent years the Service has found it advantageous to take on the manufacture of additional lighthouse devices.

A constant effort is made to improve the mechanics of existing aids and to find new and more efficient aids to navigation. For this work the Service maintains a small laboratory where experiments are conducted on the various light and sound-producing devices submitted by makers for test or designed and perfected by the technical employees of the Service.[15]

Among the more important improvements effected by the Service during recent years have been:

The development (with the Bureau of Standards) of the radio fog signal.

The perfection of the automatic aerial fog bell having a striking mechanism operated by compressed gas.

Successful experiments with silk mantles to replace cotton mantles for use in incandescent oil-vapor illuminating apparatus.

The development of a special metal cone buoy, designed to replace wooden buoys which are subject to damage by ice, etc.

The annual report for 1925 lists the following among the betterments to aids accomplished during that year:

Improvements in the operation of primary electric batteries and small incandescent lamps for use in minor lighted aids.

Additional improvements in the design of a gong buoy, developed to provide a distinctive buoy sound-signal.

[14] Reg. U.S.L.H.S. Chapter V.

[15] The supplies, etc., purchased by the Service are also analyzed and tested at this laboratory.

Changes in apparatus used in connection with electric illumination of the light stations, providing relays in case of failure of bulbs and alarm in case of failure of current.

Supervisory Duties. Incidental to its regular work of maintaining the aids to navigation the Bureau of Lighthouses performs certain supervisory duties. These may be grouped under the general heads of lighting of bridges, operation of private aids, and marking of wrecks. The Service is also charged with the duty of enforcing the laws for the protection of aids.

Lighting of Bridges. By the act of August 7, 1882 (22 Stat. L., 301, 309), and the amendments of March 23, 1906 (34 Stat. L., 84, 85), May 14, 1908 (35 Stat. L., 160, 162), and June 23, 1910 (36 Stat. L., 593, 595), all parties owning, occupying, or operating bridges over any navigable river are required to maintain at their own expense, from sunset to sunrise, throughout the year, such lights as may be required by the Commissioner of Lighthouses.

Special regulations are issued on the subject, including also the lighting of sheer booms, piers, dams, and similar obstructions to navigation.[16] The regulations prescribe standard methods for marking the piers and waterways of bridges, with the various combinations of red and green lights for different classes of bridges. The bridges are inspected at intervals by the District Superintendents, and any deficiency in lights is called to the attention of the owners.

On June 30, 1925, there were 1661 bridges lighted in accordance with the above provisions.[17]

Private Aids. Section 3 of the act of June 20, 1906 (34 Stat. L., 324), authorizes the maintenance of private aids to navigation under the general supervision of the Commissioner of Lighthouses. The act says:

> That after the first day of January, nineteen hundred and seven, it shall be unlawful for any person, company, corporation, or municipality not under the control of the Commissioner of Lighthouses, to establish, erect or maintain in the navigable waters of the United States any light as an aid to navigation, or any other aid to navigation similar to any of those maintained by the United States under the control and direction of the Commissioner of Light-

[16] Bureau of Lighthouses, Regulations for lighting bridges, 1920.
[17] See Table 8, Appendix 4, for list of lights on bridges.

houses, without first obtaining permission so to do from the Commissioner of Lighthouses, in accordance with rules and regulations to be established by the Secretary of Commerce . . . ; and any person violating the provisions of this section or any of the rules and regulations established by the Secretary of Commerce . . . in accordance herewith, shall be deemed guilty of a misdemeanor and be subject to a fine not exceeding the sum of one hundred dollars for each offense, and each day during which such violation shall continue shall be considered as a new offense.

In accordance with this provision the Commissioner, under the authority of the Secretary of Commerce, has issued rules and regulations governing the establishment and maintenance of private aids.[18] Light and fog signals on ferry slips and on piers used only by certain vessels, and stakes, bushes, and barrel buoys marking shallow and little used channels, are not affected by these rules.

Private aids are usually under the control of municipalities, corporations, yacht clubs, or other organizations. They are, however, entitled to the same protection as is afforded the aids maintained by the Lighthouse Service (38 Stat. L., 926, 928).

On June 30, 1925, there were 1009 authorized private aids, of which 289 were lights, fifty lighted buoys, 566 unlighted buoys, sixty-seven other unlighted aids, and thirty-seven fog signals.[19]

These figures do not include the temporary aids to navigation maintained by the War Department in connection with its harbor or channel improvement work. When such aids are placed or removed by the district engineers, special reports are made to the Bureau of Lighthouses and the changes noted in the "Notice to Mariners."[20]

Marking of Wrecks. The river and harbor act of March 3, 1899 (30 Stat. L., 1121, 1152), contained a provision that whenever a vessel, raft, or other craft is wrecked and sunk in a navigable channel, it shall be the duty of the owner immediately to mark the sunken craft with a suitable buoy or beacon during the day, and a lighted lantern at night.

Previously Congress had authorized the Lighthouse Board (15 Stat. L., 249), when it considered it necessary, to place a light vessel or other suitable warning of danger on any wreck or temporary obstruction to the entrance of any harbor or in the channel

[18] Bureau of Lighthouses, Circular letter 213, 2 ed., March 25, 1915.
[19] See Table 8, Appendix 4, for list of private aids.
[20] Engineer Department, Circular 10, 1911.

of any bay or sound. These two provisions now operate jointly to govern the marking of wrecks.

When an unmarked wreck constituting a menace to navigation is found, the District Superintendent is instructed to report the same to the Engineer Department at Large and to take immediate steps for marking the obstruction. The marks placed on wrecks by the Lighthouse Service are maintained until the wreck is removed or is marked by the owner. A wreck may be marked at the owner's request for a period not to exceed thirty days, unless authority is obtained from the Commissioner to extend this time. Reasonable charges for marking wrecks, including the cost of supplies, the depreciation of buoys, and the time of tenders, based on schedules prescribed by the Commissioner of Lighthouses, are made to the owners of vessels.[21]

It is the duty of the employees of the Service to observe and report all violations of the above provisions.

Enforcement Laws for the Protection of Aids. Another duty of the employees of the Lighthouse Service is to keep a careful watch for all violations of the laws passed for the protection of aids to navigation. Congress has passed several acts (35 Stat. L., 160, 162; 35 Stat. L., 1088, 1146) prohibiting the exhibition of "false lights," and making it unlawful for any person to obstruct or interfere with any aids to navigation established or maintained by the Lighthouse Service or to anchor any vessel on any of the navigable waters of the United States so as to obstruct or interfere with range lights maintained therein. On March 3, 1918, Congress passed an act (38 Stat. L., 928) which extended the protection afforded the aids maintained by the government to include those established and operated by private individuals.

In addition to the federal provisions for the protection of aids, various states have passed laws imposing penalties for the interference in any manner with the aids to navigation maintained by the United States.[22]

[21] U.S.L.H.S., Regulation 83.

[22] The following states have passed such laws: Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, Florida, Alabama, Texas, Porto Rico, Ohio, Michigan, Minnesota, Wisconsin, California, Oregon, and Washington.

Coöperation With Other Governmental Agencies. The Lighthouse Service coöperates with other branches of the National Government engaged in related work. Some of these activities are provided for by law; others are governed by regulations issued by the Bureau of Lighthouses and the coöperating services; still others are performed on a more informal basis.

The Secretary of the Treasury is authorized to establish Coast Guard stations at such lighthouses as he deems best, and the keepers of such lights are charged with the responsibility of taking care of the boats and apparatus put in their care (10 Stat. L., 597).

The Secretary of War or the Chief of the Weather Bureau may establish signal stations at lighthouses and connect them with the points necessary for the proper discharge of the signal service. Where no telegraph lines are in operation, suitable lines may be installed (R. S., 223).

The act of March 3, 1915 (38 Stat. L., 926, 928), provides for coöperation between the Lighthouse Establishment and the Forest Service in the management of the forest land on lighthouse reservations. The same act makes the annual appropriations of the Lighthouse Service available for defraying the expenses incident to this work.

The relationship between the Bureau of Lighthouses and the War and Navy departments, authorized by the act of August 29, 1916 (39 Stat. L., 556, 602), has already been discussed.[23] These provisions are only in force in times of "national emergency."

The Hydrographic Office issued an order in 1916[24] directing the employees of that service to forward any information affecting aids to navigation to the Superintendent of the lighthouse district involved. The order further instructed the branch hydrographic offices to make such suggestions and recommendations as they considered advisable concerning the aids under the jurisdiction of the Bureau of Lighthouses.

Keepers of Coast Guard stations have been directed to keep a lookout through the beach patrol for stray buoys washed ashore along the coasts, and to secure such buoys when it can be done without interfering with their regular duties and to report their

[23] Chapter I.
[24] H. O. Circular, Feb. 18, 1900; U.S.L.H.S., Reg. 64.

discovery or action to the nearest representative of the Lighthouse Service.[25]

Officers of vessels operated by the Bureau of Navigation are directed to report any information affecting aids to navigation directly to the Lighthouse Superintendent of the proper district. All inspectors of the Steamboat-Inspection Service are instructed to transmit immediately to the Superintendent of the lighthouse district in which a collision occurs, all reports received by them of the collisions of vessels with lightships, buoys, or other aids to navigation.[26]

Additional coöperative arrangements have been worked out. Notices to mariners are issued jointly with the Coast and Geodetic Survey, and information affecting charts is supplied to that service for publication. Similar information is furnished by the Lighthouse Service to the Lake Survey and other government offices publishing charts. Meteorological observations are made for the Weather Bureau at selected lightships and stations, and information respecting ocean currents is obtained for the Coast and Geodetic Survey and the Hydrographic Office. Lighthouse employees are instructed to notify immediately the nearest Coast Guard station, of vessels in distress or persons in danger.[27]

The Public Health Service coöperates in matters of sanitation affecting lighthouse stations and vessels. The Bureau of Standards engages in joint experiments on special lighthouse equipment. The Bureau of Mines analyzes coal and oil used by the Lighthouse Service. The Steamboat-Inspection Service jointly engages in the inspection of steam plants of vessels. The Navy Department permits the Lighthouse Service to purchase from the navy yards and naval stations, provisions and clothing for the crews of vessels and also, when they can be spared, fuel and miscellaneous supplies. Similar privileges are afforded some of the stations by the War Department. The Department of Agriculture is concerned with the protection of migratory birds on lighthouse reservations.

In the three river districts where Army officers are in charge of the lighthouse work, coöperation is had with the Corps of

[25] Treasury Dept., Letter of March 25, 1911.
[26] Department of Commerce, Circular 70, 1905.
[27] U.S.L.H.S., Reg. 64.

Engineers of the War Department in connection with river and harbor improvements. Special aids are maintained by the Service for such work, and reports of improvements and other changes that will affect aids to navigation, marking of channels, lighting of wrecks, etc., are furnished by the War Department.

Saving of Life and Property. It frequently happens that in the performance of their regular duties, opportunity presents itself to lightkeepers and vessel employees of the Lighthouse Service to give assistance to persons in distress. In such cases it is the duty of the lightkeepers and their assistants, and of the officers and crews of vessels, to give and summon aid to vessels in distress, whether public or private. They are instructed to assist in saving life and property from the perils of the sea when it is practicable to do so.

The annual reports of the Commissioner of Lighthouses contain many records of the heroic work of lighthouse employees in the saving of life and property. It is customary in the reports to give the name of the vessel or employee rendering the service, the object or person aided, and the nature of the assistance performed. In cases involving great personal danger, recommendation has sometimes been made for the award of life-saving medals.

The annual report for 1923 mentions 115 instances of the saving of life and property or rendering valuable aid by employees of the Lighthouse Service. The report of 1924 mentions 125 such instances, and the report for the fiscal year 1925 shows ninety-five similar cases.

CHAPTER III

ORGANIZATION

The Lighthouse Service is under the supervision of a Commissioner, who is appointed by the President without senatorial confirmation. The Commissioner is directly responsible to the Secretary of Commerce. In the organic act, provision is also made for a Deputy Commissioner, a Chief Constructing Engineer, and a Superintendent of Naval Construction, all apppointed in the same manner as the Commissioner, and a Chief Clerk " and such inspectors, clerical assistants and other employees as may from time to time be authorized by Congress."

The central office, known as the Bureau of Lighthouses, is located at Washington, and there are nineteen lighthouse district offices throughout the country.

There are three main branches of the organization:

General Administration
Engineering Divisions
Field Establishment

The first two are in the central office. The designation, " Field Establishment," is here arbitrarily adopted to include the various groups operating outside of Washington, comprising what are informally but officially termed " Field Service," " Keepers of lighthouses, etc.," " Officers and crews of light vessels, etc."

General Administration. Administrative work of a general nature is conducted through the following units:

Office proper of the Commissioner
The Deputy Commissioner
Office of the Chief Clerk

Office proper of the Commissioner. At the head of the Bureau is the Commissioner, who exercises general control over the work in all its branches. More specifically, he has responsibility for

Construction, maintenance, inspection, and supervision of aids to navigation and of property connected therewith
Custody of institutional records, etc.

Purchasing of sites and preparation of plans for structures and vessels, when authorized by Congress

Formulation of regulations, subject to the approval of the Secretary of Commerce, to govern contracts for the purchase of materials; also the making of such contracts or the substitution of other methods of purchase at discretion

Formulation of regulations, subject to the approval of the Secretary of Commerce, to govern the work of the Service

Adjustment of claims for damages by collisions for which lighthouse vessels are responsible, subject to the approval of the Secretary of Commerce

In practice many of these duties are performed through the several divisions, and the work of supervision and direction alone is left in the hands of the Commissioner and Deputy Commissioner.

The Deputy Commissioner. Assisting the Commissioner of Lighthouses, and second in rank, is the Deputy Commissioner, who reviews the work of all the divisions and the field establishment and makes recommendations relative thereto to the Commissioner. The Deputy Commissioner is also in general charge of all matters concerning personnel. In the absence of the Commissioner, the Deputy Commissioner acts as Commissioner.[1]

Office of the Chief Clerk. The Office of the Chief Clerk is under the personal supervision of the Chief Clerk. The organic act makes provision for the appointment of such an officer, "who shall be entrusted with the duties of Chief Clerk and such other duties as may be assigned to him by the Secretary of Commerce . . . or the Commissioner." In practice the Chief Clerk is in immediate charge of the detail work of the general office in Washington and directs the clerical and messenger force. He is also charged with seeing that all laws, regulations, and precedents of the Service are observed. Specifically, the duties of the Chief Clerk comprise the following:

Review of all office correspondence prepared for the signature of Bureau officers

[1] The act of July 27, 1912 (37 Stat. L., 238, 239), provided that in the absence of both the Commissioner and Deputy Commissioner of the Bureau of Lighthouses, the Secretary of Commerce may designate some other officer of the Bureau to perform the duties of the Commissioner during such absence.

Immediate supervision of the preparation of correspondence relative to the establishment of, or changes in, aids to navigation and all projects concerning repairs or improvements to stations, vessels, depots, etc.

Preparation of the monthly reports for submission to the Secretary of Commerce and the "Service Bulletin" for distribution to the field establishment

Distribution of all incoming and the despatch of all outgoing mail, and the charge of the Bureau's library

Direction of the work of the following administrative divisions:

Finance Division
Law and Property Division
Personnel Division
Files Division

The Finance Division handles financial, accounting, and bookkeeping matters of the Service. It prepares the estimates for appropriations and the financial and other statements in support thereof. It makes the allotments under the various appropriations and advises the District Superintendents and special disbursing agents in regard to expenditures and other financial matters, such as applicability of appropriations for specific projects, etc. The Division also prepares travel orders and requests for transportation; it prepares and examines all vouchers covering expenditures for the Bureau before their payment by the disbursing officer of the Department of Commerce, and audits the disbursements made by the disbursing officers in the field; and makes all transfers and adjustments of appropriations involving the Bureau and other branches of the National Government.

The Law and Property Division has charge of all legal matters relating to the preparation and examination of all contracts pertaining to the construction and equipment of lighthouses, lighthouse depots, and lightships, and the purchase of supplies and services. It drafts bills and prepares contracts relative to the acquisition or disposal of land or other property and draws up all leases for the rental of land on which lighthouses and lighthouse depots are to be built. It is concerned with all matters connected with transfer of property to and from other government establishments.

The Law and Property Division also coöperates with the Department of Justice in enforcing the laws pertaining to the Lighthouse Service, such as the lighting of bridges, the placing of private aids,

the collection of expenses incurred in marking wrecks, etc., and for damages to lighthouse property by private parties.

The Personnel Division considers nominations and makes recommendations to the Commissioner in all matters affecting personnel. It has custody of and supervises the keeping of leave records of the employees, and prepares the payrolls for the Finance Division. The Division has charge of the records showing changes in personnel, and through the Department it makes regular reports of such changes to the Civil Service Commission. It conducts all routine correspondence relating to the appointment, promotion, transfer, or dismissal of employees of the Service.

The Files Division is in immediate charge of the filing system of the Bureau. It indexes and distributes incoming mail, keeps check on the outstanding reports required by regulation, and prepares all papers (excepting those pertaining to personnel) for filing, indicating action therein.

Engineering Divisions. Three divisions at the central office are concerned with matters of engineering and operation.

Engineering Construction Division. The Engineering Construction Division has general charge of the preparation of plans and specifications for, and the construction of, structures on land. More specifically its duties include:

Determination of the necessity for, and the location, character and cost of light and fogsignal stations and depots and the suitability and extent of sites

Examination of the preliminary plans, specifications, and estimates for lighthouses, towers, dwellings, fogsignal buildings, and other land equipment; and, when required, the preparation of such plans

Inspection of materials and workmanship entering into the construction and repair of light and fog signal stations and depots, including inspection of work in progress and completed works; examination of the design of all illuminating machinery and other apparatus supplied by the general lighthouse depot

Supervision of miscellaneous matters concerning real estate; contracts in preparation and under way; petitions relating to aids, proposed or established; and custody of records relating to property, plans, specifications, reports, etc.

The work of the Division is directed by the Chief Constructing Engineer, who is also charged with the special duty of acting for the Deputy Commissioner in the latter's absence.

Marine Engineering Division. The Marine Engineering Division has general supervision over all matters involving marine engineering and the repair of vessels and other floating equipment of the Service. This Division is in charge of the Superintendent of Naval Construction, who directs the following work:

Preparation of designs of new tenders and lightships and the designs, plans, and specifications for the construction of buoys and their moorings

Inspection of vessels during construction

Review and approval of plans submitted by contractors (before commencing work), showing details of construction

Inspection of materials for new works and of repairs for old

Survey of vessels and other floating equipment prior to the execution of any extensive or costly repairs which may be requested by a District Superintendent

Examination and filing of miscellaneous periodical reports concerning lightships and lighthouse tenders

In addition to supervising the work of this Division the Superintendent of Naval Construction is charged with the special duty of acting for the Deputy Commissioner when that officer and the Chief Constructing Engineer are absent.

Hydrographic Division. The Hydrographic Division handles all matters concerning the establishment, changes in, or discontinuance of, aids to navigation, so far as these affect primarily the requirements of navigation. The work of this Division is conducted by an Assistant Engineer and comprises:

Review of all recommendations for the establishment, change, or discontinuance of aids to navigation

Preparation of copy for publication in the "Notices to Mariners" and the correction and revision of light and buoy lists

Correction of charts and the verification of data concerning aids to navigation to be used in the revision of nautical charts

Consideration of applications for the establishment of private aids to navigation

Field Establishment. The actual operation and maintenance of the aids to navigation is carried on by the Field Establishment of the Lighthouse Service. For purposes of administration the organic act provided that "the Commissioner of Lighthouses, subject to the approval of the Secretary of Commerce . . . , shall

rearrange the ocean, gulf, and lake coasts, and the rivers of the United States, Porto Rico and the naval stations of Cuba into not exceeding nineteen lighthouse districts."

Lighthouse Districts. Exercising the discretion permitted him by law, the Commissioner established nineteen districts. These with their designations, boundaries, and headquarters are as follows:

First District: From the head of navigation on the St. Croix River, Me., the northeastern boundary of the United States, to and including Hampton Harbor, N. H. It embraces all aids to navigation on the seacoast of Maine and New Hampshire and on all tidal waters between the limits named. Headquarters: Portland, Me.

Second District: From Hampton Harbor, N. H., to Elisha Ledge off Warren Point, R. I., but not including either the harbor or the ledge. It embraces all aids to navigation on the seacoast and tidal waters of Massachusetts, except on the Taunton River and that part of Mount Hope Bay lying within the State boundary. Headquarters: Boston, Mass.

Third District: From Elisha Ledge, off Warren Point, R. I., to Cape May on the coast of New Jersey, excepting Cape May Lighthouse, and to a point on the coast opposite Rehoboth, Del., excepting Cape Henlopen Lighthouse and Hen and Chickens Shoal. It embraces all aids to navigation on the coasts of Rhode Island, Connecticut, New York, and New Jersey northward of Cape May, including Northeast End, Five-Fathom Bank, and Overfalls Light Vessels, and McCries Shoal, and on all tidal waters tributary to the sea or Long Island Sound between the limits named, together with the aids on Whitehall Narrows and on the United States waters of Lakes Champlain and Memphremagog. Headquarters: Staten Island, New York.

Fourth District: From Cape May, including Cape May Lighthouse on the coast of New Jersey, to and including Fenwick Island Light Station on the coast of Delaware. It embraces all aids to navigation on the seacoasts of New Jersey and Delaware between the points named, the Delaware River and waters tributary thereto, the Delaware Bay and entrance to Delaware Bay, excepting McCries Shoal, Overfalls Light Vessel, and seaward shoals. Headquarters: Philadelphia, Pa.

Fifth District: From but not including Fenwick Island Light Station on the coast of Delaware to and including New River Inlet, N. C. It embraces all aids to navigation on the seacoasts of Delaware, Maryland, Virginia, and North Carolina between the limits named, all of Chesapeake Bay, the sounds of North Carolina and tributary waters. Headquarters: Baltimore, Md.

SIXTH DISTRICT: From but does not include New River Inlet, N. C., to and including Hillsboro Inlet Light Station, Fla. It embraces all aids to navigation on the seacoasts, bays, sounds, harbors, rivers, and other tidal waters of North Carolina, South Carolina, Georgia, and Florida between the limits named. Headquarters: Charleston, S. C.

SEVENTH DISTRICT: From a point just south of Hillsboro Inlet Light Station to and including the Suwanee River, Fla. It embraces all aids to navigation on the sea and Gulf coasts of Florida, Florida Keys, and on other waters tributary to the sea and Gulf between the limits named. Headquarters: Key West, Fla.

EIGHTH DISTRICT: From, but not including the Suwanee River, Fla., to the southern boundary of Texas. It embraces all aids to navigation on the Gulf coast of the United States and tidal waters tributary to the Gulf between the limits named, together with those on the Mississippi River below and including New Orleans, and on Grand Lake and Lake Chicot. Headquarters: New Orleans, La.

NINTH DISTRICT: The island of Porto Rico and the adjacent islands, the American Virgin Islands, and other islands and stations ceded to the United States in the West Indies. Headquarters: San Juan, P. R.

TENTH DISTRICT: From the mouth of the St. Regis River, St. Lawrence River, N. Y., to the mouth of the Detroit River. It embraces all aids to navigation on the United States shores and waters of Lakes Ontario and Erie, and the upper part of the St. Lawrence River and the Niagara River, excepting aids to navigation at the mouth of the Detroit River. Headquarters: Buffalo, N. Y.

ELEVENTH DISTRICT: From and including all aids to navigation at the mouth of the Detroit River, Mich., to the western end of Lake Superior. It embraces all aids to navigation on the United States shores and waters of Lakes St. Clair, Huron, and Superior, and Lake of the Woods, the Detroit River, including the mouth, the St. Clair, St. Mary's and Rainy Rivers, and that part of the Straits of Mackinac lying to the eastward of a line drawn across the straits just to the eastward of Old Mackinac Point Light Station, Mich. Headquarters: Detroit, Mich.

TWELFTH DISTRICT: Includes all aids to navigation on Lake Michigan, Green Bay, and tributary waters lying west of a line drawn across the Straits of Mackinac just east of Old Mackinac Point Light Station, Mich. Headquarters: Milwaukee, Wis.

THIRTEENTH DISTRICT: The Mississippi River from the head of navigation to the mouth of the Missouri River; Lake Traverse, Minn., and S. Dak., the Minnesota, Illinois, Osage, Gasconade, and Missouri Rivers, each from the head of navigation to its mouth;

and includes all aids to navigation within these limits and navigable rivers tributary thereto. Headquarters: Rock Island, Ill.

FOURTEENTH DISTRICT: The Ohio River from Pittsburgh, Pa., to Cairo, Ill., the Tennessee and Kanawha Rivers, each from the head of navigation to its mouth; and embraces all aids to navigation within these limits and navigable rivers tributary thereto. Headquarters: Cincinnati, Ohio.

FIFTEENTH DISTRICT: The Mississippi River from and including the mouth of the Missouri River to New Orleans, La., the Red River from the head of navigation to its mouth, and includes all aids to navigation within these limits and navigable rivers tributary thereto. Headquarters: St. Louis, Mo.

SIXTEENTH DISTRICT: From the boundary between Alaska and the Dominion of Canada to the boundary between Alaska and Siberia. It embraces all aids to navigation on the seacoast, bays, rivers, and other tidal waters of Alaska. Headquarters: Ketchikan, Alaska.

SEVENTEENTH DISTRICT: From the boundary between California and Oregon to the northern boundary of the United States. It embraces all aids to navigation on the seacoast of Oregon and Washington, on the United States waters of the Juan de Fuca Strait, Washington Sound, and the Georgia Strait, and on the tidal waters tributary to the sea, straits, and sounds between the limits named. Headquarters: Portland, Oreg.

EIGHTEENTH DISTRICT: From the boundary between California and Mexico to the boundary between California and Orgeon. It embraces all aids to navigation on the seacoast, bays, rivers, and other tidal waters of California. Headquarters: San Francisco, Calif.

NINETEENTH DISTRICT: Embraces the Hawaiian Islands, the Midway Islands, the Island of Guam, and the American Samoan Islands, and includes all aids to navigation in the waters thereof. Headquarters: Honolulu, Hawaii.

The nineteen districts are in charge of as many Superintendents of Lighthouses.[2] The Superintendents of the thirteenth, fourteenth and fifteenth districts (the three river districts) are officers of the Corps of Engineers of the Army, detailed to serve in that capacity.

District Superintendents: Each Superintendent is in charge of all the work of the district to which he is assigned. He is responsible to the Commissioner for the proper management of the light stations, fog signal stations, lightships, relief lightships,

[2] Prior to the act of June 20, 1918 (40 Stat. L., 607, 608), these officers were known as "Lighthouse Inspectors."

lighthouse tenders, and depots. The Superintendent's duties also include the maintenance, repair, and operation of all lighthouse craft permanently or temporarily located in his district. He supervises the construction of new aids and additions to aids (with the exception of major projects). He is responsible for the repair of all property in his district, for keeping ready for service upon immediate notice, all spare or relief moorings, buoys and buoy appendages, and relief lightships. He directs the field force and the work of the stations and vessels within his jurisdiction. He supervises the placement of lightships, the disposition of abandoned or partially destroyed aids, the restoration of damaged or displaced aids, and the arrangement with owners and agents of vessels for the repair of damages done by them to aids. He directs the removal of aids in the winter and their replacement in the spring, the docking of vessels, and the movement of vessels to navy yards for repairs, supplies, stores, and equipment. He issues local notices to mariners of casualty to, restoration of, or changes in aids to navigation.

The District Superintendent makes recommendations, upon application by maritime interests, for the establishment of lights, lightships, and other aids to navigation, and also upon applications for establishing private aids. He investigates the proposed installations and directs the preliminary surveys, prepares rough plans for new construction, including estimates of cost, and reports his findings to the Commissioner. Under the Commissioner's direction he carries on negotiations for the acquisition of land for the establishment of aids, and obtains cession of jurisdiction from state authorities. The Superintendent advertises for and accepts bids for the supply of equipment, materials, supplies, and services.

In matters of coöperation with other services the Superintendents have certain specific duties. They furnish marine information to the field branch of the Hydrographic Office of the Navy, and to the Coast and Geodetic Survey. They coöperate with the local Army Engineer offices in the establishment of temporary aids and refer to them plans and specifications for wharves and piers and for the laying of cables which may obstruct navigation. The Superintendents receive reports of displaced buoys from the Coast Guard, the Coast and Geodetic Survey, and from Navy vessels.

The Superintendents submit to the Commissioner annual reports dealing with the entire work in their respective districts. In addition they prepare special reports containing recommendations for the establishment, change, or discontinuance of fixed or floating aids. The periodical reports also show corrections to charts and to light and buoy lists; the transfer of vessels for overhaul and repair; collisions involving lighthouse vessels, and all violations of the laws relating to public and private aids to navigation. The miscellaneous reports furnished the Superintendents by lightkeepers and masters of vessels are transmitted to the Commissioner.

Assistant Superintendents. The Superintendents are assisted in the performance of their duties by one or more Assistant Superintendents. Under the Superintendents' direction, the latter inspect depots, tenders and the fixed and floating aids, and report upon the condition of the plant and equipment and on the efficiency of the personnel. They instruct the personnel at the stations in the care and operation of light and fog signal apparatus. They inspect and test supplies, materials, and equipment before final purchase, and assist the Superintendents in the inspection of all construction and repair work in progress. They keep up to date, the light and buoy lists, and plot the position of new or changed aids on standard charts.

Chief Clerk and Disbursing Officers. Each district office has a Chief Clerk and Disbursing Officer, who is in charge of the clerical work of the office. He pays all expenses of the office and of the stations, depots, and vessels under its supervision, including salaries, costs of construction and repair, and outlays for supplies and equipment. Under his supervision are prepared the data for the weekly Notice to Mariners, and accounting reports of receipts and disbursements for the Commissioner. The Chief Clerk also furnishes records, report forms, instruments, charts, and nautical publications to tenders and lightships.

In addition to the above, each district office includes a staff of clerks and technical employees, such as mechanics, draftsmen, and special lighthouse technicians.[3] Each district is, in effect, a separate

[3] For detailed list of personnel in each district as of June 30, 1925, see Chapter IV.

establishment and comprises, in addition to the district offices, the following:

Lighthouse Depots
Field Construction Force
Lighthouse Tenders
Lightships
Light Stations

Lighthouse Depots. One or more lighthouse depots are located in each district for the purpose of storing and distributing supplies, equipment, and apparatus, and repairing equipment.[4] On June 30, 1925, the following lighthouse depots were maintained:

First District	Bear Island, Maine Little Diamond Island, Maine *
Second District	Chelsea, Massachusetts * Woods Hole, Massachusetts
Third District	Atlantic City, New Jersey Goat Island, Rhode Island Juniper Island, Vermont New London, Connecticut Staten Island, New York * Tucker Beach, New Jersey
Fourth District	Edgemoor, Delaware * Lewes, Delaware
Fifth District	Annapolis, Maryland Lazaretto Point, Maryland Point Lookout, Maryland Portsmouth, Virginia * Washington Wharf, D. C. Washington, North Carolina Coinjock Cut, North Carolina
Sixth District	Charleston, South Carolina *
Seventh District	Egmont Key, Florida Key West, Florida *
Eighth District	Fort San Jacinto, Galveston, Texas Mobile, Alabama Port Eads, Louisiana *
Ninth District	San Juan, Porto Rico *

[4] In the thirteenth, fourteenth, and fifteenth districts, there are no depots or light stations. Aids to navigation are cared for by contract labor.

* Indicates the principal depot of the district.

Tenth District	Buffalo, New York *
	Erie, Pennsylvania
	Maumee Bay, Ohio
	Rock Island, New York
	Sandusky Bay (Cedar Point), Ohio
Eleventh District	Detroit, Michigan *
	Minnesota Point, Minnesota
	St. Marys River, Michigan
Twelfth District	Charlevoix, Michigan
	Milwaukee, Wisconsin *
Sixteenth District	Ketchikan, Alaska *
Seventeenth District	Ediz Hook, Washington
	Tongue Point, Oregon *
Eighteenth District	Goat Island, California *
Nineteenth	Honolulu, Hawaii *

The principal features of a depot are a dock and a storehouse. To these are added such other structures as may be required. At some depots there are isolated oil houses for inflammable articles; lamp, machine, carpenter, and blacksmith shops; cement houses; buoy, lumber, and coal sheds; officers' and keepers' dwellings, and derricks and other apparatus, depending on the extent and character of the work in the district.

Each lighthouse depot is in charge of a depot keeper, who requisitions stores and issues supplies, materials, and equipment, for the maintenance and operation of all floating and fixed aids to navigation and for the lighthouse tenders. The depot staff maintains a card record of the receipts and issue of supplies, materials, and equipment, and files of property vouchers and other records. An annual property return is submitted through the Superintendent to the Commissioner of Lighthouses.

In addition to the several district depots there is on Staten Island, New York Harbor (Third District), a general lighthouse depot. Here are purchased and stored supplies, which are distributed to other districts as required. At the general lighthouse depot are also located, the shops where much of the special apparatus of

* Indicates the principal depot of the district.

the Service is manufactured or repaired, and a small laboratory for the analysis and testing of articles used in the Service. Experimental work on light and sound producing devices is carried on at this laboratory.

Field Construction Force. Attached to each district office is a field construction force composed of carpenters, painters, masons, mechanics, and laborers. These field crews do the repair and upkeep work on the permanent aids and on the other aids that cannot conveniently be moved to the depot shops. When the Service engages in its own construction work, the field construction force is assigned to that duty.

Lighthouse Tenders. Under the direction of the Superintendent of Lighthouses and operating under the district office, are the lighthouse tenders,[5] which place, replace, and move all floating aids to navigation; deliver fuel, supplies, and construction materials to light stations and vessels and transport officers travelling on government business.

While cruising in the performance of their duties, the tenders note the condition and position of all floating aids to navigation, adjusting their positions when necessary. They remove or mark floating aids to navigation which have been abandoned or irreparably damaged. They note and report conditions of navigation which affect the accuracy of charts, Coast Pilots, sailing directions, and other marine publications and records. They render assistance to light ships out of position. They make such repairs as are possible to damaged aids, and to defective light apparatus at light stations and on lightships. Incidentally, they perform certain police duties, assisting in the prevention of smuggling and in the protection of government property.

Lightships. Lightships[6] equipped with light, submarine bell and fog signal apparatus, and wireless apparatus are permanently moored at locations where it is impracticable to maintain stationary lights. The crews, in addition to caring for the vessel and operating, cleaning, and repairing the lights and signals, perform certain incidental duties. They watch for defects in, or displacement of, aids

[5] See Table 6, Appendix 4, for details concerning the number and location of lighthouse tenders.

[6] See Table 3, Appendix 4, for details concerning the number and location of lightships.

to navigation within their vicinity; and for new obstructions to navigation and for changes in channels. They notify Coast Guard cutters of ships and persons in distress, and themselves render aid as far as possible. The master of each vessel reports to the Commissioner through the District Superintendent concerning damages to, or interference with, aids to navigation by vessels, defects or displacements of aids, and the necessity of marking wrecks and obstructions or changes in channels.

Light Stations. The light stations are the permanent stationary lighted aids and the appurtenances thereto. A completely equipped light station on a land site usually consists of the light tower, oil house, fog signal building, keeper's dwelling, workshops, water supply and drainage systems, landing wharf, boathouses and ways, barns, sheds, etc. In some instances a single building serves for several purposes. On submarine sites the whole station is usually confined to one structure. Each station is in the charge of a light keeper and from one to four assistant keepers, depending on the size and importance of the station.

The keeper and his assistants have about the same duties with respect to the stations that the master and crew have in the case of the lightships. The keepers operate, clean, and repair the lights and fog signal apparatus. They maintain and repair the building on the station reservation, and assist working parties in construction and repair work. The keeper reports to the Commissioner, through the District Superintendent, all cases of damage by shipping to aids to navigation or interference with aids, defects in, or displacements of, aids to navigation within his vision and all other information concerning new dangers, etc.

The light stations take charge of Coast Guard boats committed to their care by the Secretary of the Treasury and notify the Coast Guard of persons and vessels in distress.[7] So far as their situation and equipment permit they lend aid to vessels and persons in distress and furnish provisions and clothing to shipwrecked persons.

Field Service at Large. The field service at large is not an actual division or section of the Bureau of Lighthouses. It is, however, a convenient designation for the group of six officers who are

[7] U.S.L.H.S., Reg., 1918, Par. 70; 10 Stat. L., 597.

assigned to general duty in the Lighthouse Service. In this group there are a Superintendent on General Duty, a General Examiner, two Assistant Superintendents of Construction, a Radio Engineer, and an Assistant Radio Engineer. These positions are all directly under the office of the Commissioner. In practice, however, the officers assigned to these positions spend most of their time at the different stations throughout the field. Their salaries are paid out of appropriations for the Field Service.

Superintendent on General Duty. The Superintendent on General Duty, or General Superintendent as he is sometimes called, makes periodical examinations of the work in the different districts. His examination is concerned primarily with technical matters and the physical upkeep of equipment. He makes comparisons to see that the standard set, is maintained throughout the Service. More specifically, it is the duty of the General Superintendent to report to the Commissioner on the following matters: Surplus equipment or employees in the several districts which could more advantageously be used at other points; the suitability of the construction and condition of lightships for the stations which they occupy and the competency of their officers; the condition and efficiency of operation of lighthouse tenders, and the need for increasing or decreasing the number attached to each district; the laying and repair of buoy systems by the lighthouse tenders; the program for the repair and overhauling of vessels, including provision for relief lightships; the condition and progress of all engineering and construction work; the necessity for improvements in the light and fog signal apparatus; and the need for additional aids or the change, improvement, or abandonment of existing aids to navigation.

General Examiner. The General Examiner checks up on all matters concerning office procedure and methods of supply. He moves from one district to another and examines the accounts, property records, methods of handling funds and supplies, and business methods generally. He verifies the various stock and property records at the depots, lighthouses, and vessels, and observes the arrangement of stock, the orderliness of the stores, and the safeguards employed to prevent the improper use or disposition of lighthouse property.

Assistant Superintendents of Construction. The two Assistant Superintendents of Construction are technical construction experts, either of marine or land construction. Their duties are to supervise and examine construction in process and completed works. The work being done determines the type of expert who shall be assigned to these positions. At times, therefore, the positions are filled by marine engineers, and at other times, by land construction experts. In the former case the Assistant Superintendents of Construction report to the Commissioner through the Marine Engineering Division, and in the latter, through the Engineering Construction Division. In either case, however, they are directly under the supervision and jurisdiction of the Commissioner.

Radio Engineer and Assistant Radio Engineer. The Radio Engineer and the Assistant Radio Engineer are charged with the supervision of the design, adaption, and installation of the radio equipment throughout the Service. One of their primary duties is experimentation with new devices and new methods.

CHAPTER IV

PERSONNEL

While the President may, at his discretion, in times of national emergency transfer the Lighthouse Establishment to the service and jurdisdiction of the War and Navy departments,[1] and while a large part of it was so transferred during the late war[2] the Lighthouse Service is essentially a civil organization and has been such since its organization in 1910. This applies to both the Bureau proper in Washington and the establishment in the field. The single exception is the case of the Superintendents of the three river districts, who are officers detailed from the Engineer Corps of the Army under the authority of the organic act of 1910 (36 Stat. L., 534).[3]

On June 30, 1925, there were 6951 employees in the Lighthouse Service. Of these forty were in the Bureau at Washington and 5921 in the Field Establishment. The table on the opposite page summarizes the different classes of employees by districts and by class of work. The employees of the Lighthouse Service may be separated into two main divisions: (1) The officers and personnel of the Bureau proper in Washington; (2) the Superintendents and employees in the field.

Washington Office. At the end of the fiscal year 1925 there was a total of forty employees in the Washington Office—The Bureau of Lighthouses—including the Commissioner of Lighthouses, the Deputy Commissioner, the Chief Constructing Engineer, and the Superintendent of Naval Construction. These four officers are, under the terms of the 1910 act, appointed by the President.[4] The basic law does not fix the term of office, nor does it make any restrictions as to qualifications for these positions. These are " ex-

[1] Naval appropriation act of August 29, 1916 (39 Stat. L., 602).
[2] Executive Order of April 11, 1917.
[3] See Chapter III.
[4] Without confirmation by the Senate.

cepted" positions. It is generally understood, however, that technical education and experience is a necessary prerequisite for appointment. All of these positions since 1910 have been filled through the promotion of professional engineers in the classified service. The organic act fixed the salary of the Commissioner of Lighthouses at $5000 per year and that of the other three executive officers at $4000 each. These salary provisions have all been wiped out by the adoption of the Classification Act of 1923. Under the authority of this act the Commissioner of Lighthouses now receives $6500 per year; the Deputy Commissioner, $5800; and the Chief Constructing Engineer and the Superintendent of Naval Construction, $5400 each.

EMPLOYEES IN THE LIGHTHOUSE SERVICE ON JUNE 30, 1925[5]

District	Bureau officers, engineers and draftsmen, district superintendents, draftsmen, and technical assistants	Clerks, messengers, janitors, and office laborers	Depot keepers and assistants, including laborers	Light keepers and assistants	Laborers, light attendants, and lamplighters	Light attendants and lamplighters	Custodians of reservations	Officers and crews on tenders and light vessels	Field force for construction and repair (registered)	Field force for construction and repair (unregistered)	Total
Bureau	14	26	...	...	...	...	..	...	...	...	40
First	3	5	1	113	3	...	..	74	11	13	223
Second	4	7	10	73	8	...	1	250	6	...	359
Third	15	34	10	175	34	42	2	351	243	45	951
Fourth	3	7	3	49	1	...	5	34	10	8	120
Fifth	8	10	38	147	92	20	..	280	16	3	614
Sixth	3	7	4	51	8	26	..	151	15	...	265
Seventh	3	4	3	35	...	2	..	44	5	11	107
Eighth	4	9	13	108	33	44	..	125	13	6	355
Ninth	1	5	3	35	11	...	..	26	8	16	105
Tenth	4	5	2	69	3	...	1	28	15	15	142
Eleventh ...	5	6	5	147	5	2	1	106	15	27	319
Twelfth	5	6	6	144	21	2	..	96	7	20	307
Thirteenth .	1	2	...	...	...	197	..	19	...	...	219
Fourteenth..	1	2	...	...	...	552	..	15	...	...	570
Fifteenth ..	1	2	...	...	...	321	..	21	...	...	345
Sixteenth ..	3	4	1	38	...	49	..	55	2	36	188
Seventeenth.	3	7	5	79	18	127	1	136	10	8	394
Eighteenth .	4	7	7	110	16	9	..	97	5	16	271
Nineteenth .	2	3	2	16	2	...	..	31	4	1	61
At large	6	...	...	...	...	...	..	...	...	...	6
Total ..	93	158	113	1,389	255	1,393	11	1,939	385	225	5,961

The remaining positions in the Bureau at Washington are all in the classified service. They are governed by the rules and regula-

[5] Annual Report, 1925, p. 7.

tions of the Civil Service Commission and enjoy the regular privileges of all government employees regarding leaves of absence, retirement pay, disability insurance, etc. The salaries of these employees are all fixed in accordance with the terms of the Classification Act of 1923.

Field Employees. The field employees of the Lighthouse Service make up by far the greater part of the total personnel. Only two-thirds of one per cent of the entire personnel are employed in the Washington Office. This decentralized organization, with the use of the district system, corresponds in general to the prevailing practice of large private enterprises. On June 30, 1925, there were 5921 employees in this branch of the Service, including seventy-nine technical, 132 clerical, and 5710 connected with light stations, light vessels, tenders, depots, etc. Of the latter number, 1389 were light keepers and assistant light keepers.

The nature of the field work of the Lighthouse Service is unusual in the peculiar hazard and risk involved and the comparative isolation of many of the stations. Because of this fact several remedial measures have been passed, from time to time, for the benefit of lighthouse employees. The annual report of the Commissioner for 1920 summarized these provisions as follows:[6]

Reimbursement of keepers of stations and masters of vessels for food and clothing furnished shipwrecked persons. Act of July 27, 1912 (37 Stat. L., 238, 240)

Commutation of subsistence for officers and crew of lightships and light tenders. Act of August 24, 1912 (37 Stat. L., 417, 469)

Compensation for injuries for persons in hazardous employment in the Lighthouse Service. Act of July 27, 1912 (37 Stat. L., 238, 239)

Leave of absence for per diem employees. Act of March 3, 1915 (38 Stat. L., 926, 927)

Medical handbook for stations and vessels. (Latest edition, 1915)

Medical relief for light keepers at hospitals of the Public Health Service. Act of August 28, 1916 (39 Stat. L., 536, 538)

Retirement system for the field force of the Lighthouse Service. Act of June 20, 1918 (40 Stat. L., 607, 608), and amendment of November 4 of the same year (40 Stat. L., 1020, 1036)

[6] Annual Report, 1920, p. 6.

Payment of travel expenses for teachers of children of light keepers. Act of June 20, 1918 (40 Stat. L., 607, 608)

Subsequently several other important provisions were put into effect. On June 30, 1924, the interpretation of the Classification Act of 1923 was extended to include most of the field employees of the Lighthouse Service and on March 4, 1925, Congress passed the Lighthouse Disability Retirement Act (43 Stat. L., 1261).

The pages that follow are given over to a more or less detailed discussion of the above provisions and to the other personnel problems which concern primarily the Field Establishment of the Lighthouse Service.

Appointment. All field employees, other than those employed merely as workmen or laborers, are classified under the civil service laws. Special regulations have been issued by the Civil Service Commission pertaining to the appointment, dismissal, and reinstatement of lighthouse employees.[7] All positions unless excepted under the rules of the civil service, are subject to competitive appointment. Positions in Alaska are excepted from this rule in cases in which it is impracticable to administer the civil service law.[8] Original appointment is usually to the lowest grade. The more responsible positions are filled, whenever practicable, by transfer and promotion of employees in less important positions, who have earned such consideration by reason of efficiency and length of service. Competitive positions require either an "educational" or a "non-educational" test. The former are known as educational positions, and include such technical and clerical persons as Superintendents, scientific assistants, draftsmen, aids, clerks of all grades and cadets on tenders. The registers of eligibles for original appointment to these positions, with the exception of the applications for clerical positions, are maintained by the Civil Service Commission in Washington. The registers of eligibles for all non-educational positions peculiar to the Lighthouse Service are maintained by the district civil service boards. In general, included in this class, are such positions as officers of vessels and tenders (except cadets), keepers and their assistants, and employees in the field construction force.

[7] Civil service regulations for the Lighthouse Service, January, 1913.
[8] *Ibid.*, Reg. 1.

In the case of officers of vessels, the possession of a proper license from the Steamboat-Inspection Service is a condition precedent to placing an applicant's name upon an eligible register. As far as practicable licenses are required on self-propelled vessels of the Lighthouse Service similar to those required in the merchant marine for vessels of similar service and tonnage.

Special rules are in force for making temporary appointments. Such appointments fall into two classes; appointments pending the permanent filling of vacancies, and assignments for job work where permanent appointments are not required.[9] All temporary positions, regardless of how short the duration, are offered to eligibles on the proper lists. When an emergency arises in which it is impossible to make temporary appointments in accordance with the civil service regulations, the Superintendents of the lighthouse districts are empowered, in order to meet the exigencies of the service, to recommend such appointments without prior authorization from the Bureau or the district civil service secretary.

Dismissal and Reinstatement. Dismissal and reemployment of employees are also governed by the special civil service rules. The regulations state that the lighthouse employees may be separated from the service in any one of the following ways:[10]

By "furlough for reemployment." This is considered as an equivalent to an unqualified recommendation of the employee for work of the same grade in the Lighthouse Establishment.

By "straight resignation." This includes all resignations except those tendered to avoid dismissal. Most separations are of this type.

By "separation with prejudice." In this class are included all resignations where the employee does not leave a good record but where the offense does not warrant dismissal.

By "discharge for cause." These are separations due to delinquency or misconduct and include resignations tendered to avoid dismissal.

By "being dropped during probation." Included in this class are temporary appointees dropped because of unsatisfactory conduct or capacity.

By "services no longer needed." This applies to temporary employees only.

[9] *Ibid.*, Reg. VIII.
[10] *Ibid.*, Reg. X, as corrected.

Reinstatement after removal for any of the above causes is in the discretion of the Civil Service Commission. The Lighthouse Regulations state that in no case shall a person dismissed from the Lighthouse Service be nominated or placed on duty prior to the Bureau's obtaining a decision from the Civil Service Commission as to whether reinstatement is permissible under civil service rules."[11]

Salaries and Allowances. Prior to the passage of the Classification Act of 1923 there were several statutory provisions fixing the pay and subsistence of field employees of the Lighthouse Service. The salaries of District Superintendents were fixed by law, the superintendents in all but the third district, and the three river districts receiving $3000 per year, and the superintendent of the third district receiving $3600 per year. In the three river districts, the Army officers detailed to act as superintendents received no additional salary over their pay as such officers. The pay of light keepers was fixed by law to the extent that there was a provision (40 Stat. L., 607, 609) authorizing the Secretary of Commerce to regulate the salaries of keepers of lighthouses in such manner as he considered just and proper. This act further provided that the whole sum allowed for such salaries should not exceed an average of $840 per annum for each keeper. In addition to the base pay each lighthouse keeper was entitled by law (40 Stat. L., 608) to receive one ration per day, or in the discretion of the Commissioner of Lighthouses, commutation therefor at the rate of forty-five cents per day. This was an increase of fifteen cents per day over the previous provision (35 Stat. L., 163). Both of these provisions for the ration allowance were repealed by the act of March 4, 1925 (42 Stat. L., 1261). The assumption promoting the repeal of these provisions was that the Classification Act of 1923 would take into account all subsistence and other allowances in fixing the new salary schedules.

Most of the above salary provisions have been wiped out by the adoption of the Classification Act. The District Superintendents have been put in the "professional and scientific service" as defined in that act and, with the exception of the Superintendent of

[11] U.S.L.H.S., Reg., 1918, Sec. 409.

the third district, are in Grade five of that service.[12] The Superintendent of the third district is classified under Grade six of the "professional and scientific service." Under the terms of the law (42 Stat. L., 1488, 1492), the salaries of this grade are fixed from $6000 to $7500, and the salaries of Grade five are fixed from $5200 to $6000. The sixteen Superintendents classified under the above provisions receive the minimum salary in the grade, excepting that the location and nature of the station is given consideration in fixing the compensation. In the several instances where quarters are furnished the Superintendents, deductions are made on account of the same from the base pay.

Pay of Light Keepers. The salaries of light keepers are based on the classification of the light station to which they are assigned. On June 30, 1924, the following classification of stations was adopted:[13]

CLASS 1 STATIONS: (a) Watched light stations having illuminating apparatus of minor importance (that is, less importance than fixed lights of the 4th order) and without fog signal, (b) clockpower fog signal stations without illuminating apparatus. Compensation for this class: Keeper, $1320, $1380, $1440, $1500, $1560; Assistant Keeper, $1140, $1200, $1260, $1320, $1380.

CLASS 2 STATIONS: (a) Watched light stations having illuminating apparatus of more than minor importance (4th order, oil, or equal importance) and fog signal apparatus of less importance than that required for steam or air power; (b) steam or air power fog signal stations without illuminating apparatus. Compensation for this class: Keeper, $1380, $1440, $1500, $1560, $1620; Senior Assistant Keeper, $1200, $1260, $1320, $1380, $1440; Junior Assistant Keeper, $1140, $1200, $1260, $1320, $1380.

CLASS 3 STATIONS: (a) Watched light stations having illuminating apparatus of primary importance (incandescent oil vapor apparatus of equal importance) and without important fog signal apparatus (that is, fog signals less important than those requiring steam or air power); (b) steam or air power fog signal apparatus with illuminating apparatus of less importance than that required for incandescent oil vapor. Compensation for this class: Keeper, $1440, $1500, $1560, $1620, $1680; Senior Assistant Keeper, $1260, $1320, $1380, $1440, $1500; Junior Assistant Keeper, $1200, $1260, $1320, $1380, $1440.

[12] The Superintendents of the thirteenth, fourteenth, and fifteenth districts are now, as they have been since the passage of the 1910 act, Army officers detailed to act in that capacity. Their salaries are entirely dependent on their grade and rank as such officers.

[13] Quoted from memorandum prepared by the Chief Clerk of the Bureau of Lighthouses.

Class 4 Stations: Watched light stations having illuminating apparatus of primary importance (incandescent oil vapor apparatus or of equal importance) and steam or air power fog signal apparatus or of equal importance. Compensation for this class: Keeper, $1500, $1560, $1620, $1680, $1740; Senior Assistant Keeper, $1320, $1380, $1440, $1500, $1560; Junior Assistant Keeper, $1260, $1320, $1380, $1440, $1500.

Class Unwatched Minor Lights: The groups of unwatched lights having illuminating apparatus of minor importance have not been classified into the various subdivisions. The pay for the care of these lights will be discussed immediately following.

In addition to the class pay shown above, allowances for exceptional conditions are made where the circumstances apply. For "moderate isolation" of the station, an increase of $60 is made in the base pay; for "extreme isolation," $120, and for "exceptional isolation, remoteness, and inaccessibility," $180. All keepers at stations are furnished quarters and "fuel allowance." Where family quarters are provided, a deduction of $240 a year is made from the class pay shown above.

The pay of laborers in charge of minor lights is based on the number of lights cared for, the distance to be traveled, and the conditions met. In the thirteenth, fourteenth and fifteenth districts (the river districts), the average pay is approximately $9 per month for each light tended. In the third, fifth, sixth, eighth, seventeenth, and eighteenth districts, the average pay to day laborers attending minor lights is $20 per light per month. In the latter districts the pay is considerably greater than the pay for similar work in the river districts because of the lack of uniformity of the lights; that is, in the river districts the lights are more or less of the same class while those in the other districts are "different classes of lights." In addition, the lights in these districts are located on more difficult waters.

Pay of Other Field Employees. All other employees of the field service, with the exception of the complements of vessels are paid in accordance with the terms of the Classification Act of 1923. Skilled workers, such as draftsmen, mechanics, radio operators, and other technical employees receive the same pay as employees engaged in similar work throughout the government.

As a general rule the complements of vessels are paid in accordance with the standards set by the United States Shipping Board.

The rates on the Pacific Coast are somewhat higher, due to the prevailing rates of the local shipping interests. The following daily subsistence allowance is made to officers and crews of vessels:

Officers of tenders (except in the thirteenth, fourteenth, fifteenth and sixteenth districts)	$1.00
Crews of tenders (except in the third, ninth, tenth, eleventh, twelfth, thirteenth fourteenth, fifteenth, sixteenth and eighteenth districts)	.60
Officers of tenders, sixteenth district	1.30
Crews of tenders, third, tenth, eleventh and twelfth districts	.65
Crews of tenders, ninth district	.75
Crews of tenders sixteenth district	1.05
Crews of tenders, eighteenth district	.70
Officers and crews of tenders, thirteenth, fourteenth and fifteenth districts	.65
Officers of lightships, all districts	.85
Crews of lightships (except in the third, eleventh, twelfth and eighteenth districts)	.60
Crews of lightships, third, eleventh and twelfth districts	.65
Crews of lightships, eighteenth district	.70
Working party barge fifth district, foreman and mechanic	1.00
Working party barge, fifth district, helpers, cooks, etc	.60

Additional allowance of five cents per day per man (officers and crews) is paid on vessels on which the authorized complements are six or less.

Since July 1, 1921, the officers and crews of vessels have benefited through the system of longevity pay. On March 12, 1923, the provisions concerning longevity pay were drawn up in definite form.[14] They authorized the following payment:

VESSELS—OFFICERS. Appointed officers of lighthouse vessels in all districts, except the thirteenth, fourteenth and fifteenth districts, may be granted sixty dollars additional compensation per annum after five years' continuous service in the Lighthouse Service, or two years' continuous service in grade; and one hundred and twenty dollars per annum after ten years' continuous service in the Lighthouse Service, or five years' continuous service in grade; provided, that where employees left the Lighthouse Service to enter

[14] Bureau of Lighthouses, Circular letter No. 369: Longevity.
At that time light keepers were eligible for longevity pay. Since the reclassification and adjustment of salary ranges (July 1, 1924), they are no longer included in the longevity system.

any branch of the U. S. naval or military service during the war, or who served overseas or on the high seas with organizations doing distinctive war service and who were regularly discharged therefrom, and reentered the Lighthouse Service within six months from the date of such discharge, the time served in such naval, military, or other service referred to herein, shall be counted the same as if served in the Lighthouse Service for the purpose of granting longevity pay.

VESSELS—CREWS. Members of crews of vessels in all districts, except the thirteenth, fourteenth and fifteenth districts, may be granted five dollars per month additional compensation after six months' continuous service, such longevity pay to be effective beginning on the first day of the month following that in which six months' service is completed; with the understanding that in the tenth, eleventh and twelfth districts, the discontinuance of service of members of crews during the closed season of navigation will not be considered as a separation from the service, provided they return and are placed on duty at the opening of the next season of navigation, but credit shall only be allowed for time actually employed in the Lighthouse Service toward the required period of six months' continuous service.

Persons separated from the Lighthouse Service, or on leave without pay status, on account of sickness, injury, or otherwise, through no fault of theirs and not for their own convenience, will, in the discretion of the Superintendents, be allowed credit for time already served toward the required period of continuous service, with the understanding, however, that a report of each case will be submitted to the Bureau and the Department in order that they may be apprised of the circumstances under which the authority is exercised by the Superintendents and to prevent any possible abuse of the privilege.

Retirement and Disability. Prior to June, 1918, there were no provisions for pensioning or retiring the employees of the Lighthouse Service. The first measures of this kind were embodied in the General Lighthouse Act of June 20, 1918 (40 Stat. L., 607, 608). This act provided that all officers and other employees engaged in the field service or on vessels of the Lighthouse Establishment who had reached the age of 65 after having been thirty years in the active service of the government, might at their option be retired from further performance of duties. All such officers and employees who reached the age of 70 were to be compulsorily retired from further duty. The act excepted persons who were continuously employed in offices or shops from the benefits of the

retirement provision. The law further stated that the annual compensation of persons retired " shall be a sum equal to one-fortieth of the average annual pay received for the last five years of service for each year of active service in the Lighthouse Service or in a department or branch of the Government having a retirement system, not to exceed in any case thirty-fortieths of such average annual pay received." [15] No amount on account of subsistence or other allowance was to be included.

This system of retirement was put into effect upon the appropriation by Congress of $30,000 on November 4, 1918. By the same act (40 Stat. L., 1020, 1036) the law was amended so as to except all persons in the field service from the benefits of retired pay whose duties did not require substantially all their time. The number of retirements up to June 30, 1919 (the first year the law was in effect), was one hundred, including eighty-eight persons 70 years or over.

The act of March 4, 1921 (41 Stat. L., 1367, 1417), further amended the organic retirement act of June, 1918, by stating that:

> The provision . . . relative to compulsory retirement shall not apply to an employee of the Lighthouse Service if within sixty days after the passage of this Act or not less than thirty days before the arrival of such employee at the age of seventy, the Secretary of Commerce shall certify as a matter of public record that by reason of his efficiency and willingness to remain in the Lighthouse Service of the United States the continuance of such an employee therein would be advantageous to the public service. In that event such employee may be retained for a term not exceeding two years, and at the end of two years such employee may, by similar certification, be continued for an additional term not exceeding two years: *Provided, however,* That at the end of ten years after this Act becomes effective no employee shall be continued in the Lighthouse Service beyond the age of compulsory retirement defined in the Act of June 20, 1918, . . . *Provided further,* That nothing herein shall exclude or prevent any employee of the Lighthouse Service who shall have reached the age of compulsory retirement within thirty days before or after the date of the passage of this Act from enjoying the privileges thereof.

The same act appropriated $75,000 for retirement pay of officers and other employees entitled thereto for the fiscal year 1922.

[15] Section 6, 40 Stat. L., 607, 608.

On March 4, 1925, Congress passed the act entitled "An act to provide for retirement for disability in the Lighthouse Service" (43 Stat. L., 1261). This act provides that any officer or employee entitled to retirement pay under the act of 1918, as amended, who has been in the active service of the government for fifteen years or more and who is found after examination by medical officers of the United States to be disabled for efficient service by reason of disease or injury not due to vicious habits, intemperance, or wilful misconduct on his part, is to be retired, under rules prescribed by the Secretary of Commerce, on an annuity computed in the same manner as the retired pay. The act further stated that any such officer or employee may upon recovery be restored to active duty. From time to time before reaching the age at which he is eligible for retirement, he shall be examined by a medical officer of the United States upon the request of the Secretary of Commerce.

During the seven years (June 30, 1918, to June 30, 1925), that the retirement act has been in force, there have been a total of 277 retirements. The total expenditure on account of retired pay for the period was $532,324. During the fiscal year 1925 forty persons were retired from active duty in the Lighthouse Service. Of these thirty-two were retired under the provisions of the 1918 act, and eight under the authorization of the disability act of March 4, 1925. The total expenditure on account of retired pay for the fiscal year 1925 was $121,674.

In addition to the above special provisions for retirement and disability pay, the Lighthouse Service shares with the other government agencies in the benefits of the Retirement Act of 1920 (41 Stat. L., 614), and the Employees' Compensation Act of 1916 (39 Stat. L., 642). The former applies to all employees who are not eligible to the provisions of the Lighthouse Retirement Act of 1918.[16] The latter act applies both to those subsequently provided for in the Lighthouse Disability Act of 1925 and to the remaining employees of the Bureau. It will be seen, therefore, that in some

[16] It should be remarked at this point that the Lighthouse Retirement Act provides for an annual appropriation for "Retired pay, Lighthouse Service," whereas under the terms of the General Retirement Act the retired pay comes out of the fund created by making regular deductions from the salaries of those who are to benefit under the act.

instances where disability arises, the case might fall under the provisions of either or both of two acts; that is, under the Employees' Compensation Act of 1916 or under the special Lighthouse Disability Act of 1925. The Bureau has ruled that in such an event the employee may elect under which act he will take his benefits.

When an employee whose salary is paid out of "Salaries, Lighthouse Service" or "Salaries, Lighthouse Vessels, etc.," dies without leaving an estate or family which is able to defray funeral expenses and where neither act relative to compensation for injuries applies, the necessary expenses for a decent burial, not to exceed the sum of one hundred dollars, may be paid by the Lighthouse Service out of the above named appropriations.

Other Legislation Affecting Personnel. In addition to the retirement and disability acts several other remedial measures have been passed for the benefit of the field employees of the Lighthouse Service.

Benefits of Public Health Service. Since 1886 officers and crews of lightships and tenders have been entitled to free treatment and care by the Public Health Service on the application of their commanding officers; but this arrangement was not made the subject of a formal agreement until 1913.[17] The benefits of the Public Health Service were extended to various other classes of lighthouse employees by the act of August 28, 1916 (39 Stat. L., 536, 538), which provided that "light keepers and assistant light keepers of the Lighthouse Service shall be entitled to medical relief without charge at hospitals and other stations of the Public Health Service under the rules and regulations governing the seamen of the merchant marine."[18]

Under the provisions of this act every light keeper whose original appointment is dated after the passage of this act must pass a physical examination in order to be eligible for medical relief at hospitals or other relief stations of the Public Health Service without charge. When a keeper or assistant keeper entitled to free medical relief resigns or is separated from the service for any cause, a new physical examination is not required in case he is reinstated within one year from the effective date of his resignation

[17] Public Health Service, Reg., 1920, Par. 405.
[18] See also P. H. S., Letter of October 20, 1916.

or separation. All physical examinations must be made by the Public Health Service or medical officers of the Army or Navy.

The necessary expenses of a burial are paid by the Public Health Service only in instances where the deceased was at the time of his death a patient of that service. When the friends or relatives of the deceased claim the body and assume charge of the funeral arrangements, no part of the expenses is paid by the Public Health Service.[19]

When there is no hospital or station accessible to employees entitled to free treatment by the Public Health Service, there is no authority for that service to pay the charges (or reimburse employees therefor) of private hospitals or physicians, if the same be resorted to, unless such treatment is furnished at the direction of or under proper authority of an officer of the Public Health Service.[20] In case, however, the treatment of such employees is rendered necessary by personal injuries sustained while in the performance of duty, such treatment would be subject to the 1916 compensation act (39 Stat. L., 742).

Employees who are not entitled to the benefits of the Public Health Service free of charge, may receive care and treatment at all marine hospitals and relief stations upon presentation of written requests of the officers under whose supervision they are employed, at the same rates as are charged for the care and treatment of officers and enlisted men of the Army and Navy.[21] In all such cases payment is made by the employee himself. During the fiscal year 1925 a total of 1184 lighthouse employees received treatment by the Public Health Service for an aggregate of approximately 10,144 days.

The Public Health Service also gives information and advice to lighthouse Superintendents when called upon in regard to medical questions and matters of sanitation affecting lighthouse vessels, depots, and keepers' quarters.[22] It also provides for the free vaccination of certain classes of employees against smallpox and typhoid fever. Together with the Lighthouse Service it has coöperated in the preparation of a Medical Handbook for the use

[19] P. H. S., Reg., 1913, Par. 543. See also U. S. L. H. S. Reg., 1918, Par. 501.
[20] 21 Comp. Dec., 173.
[21] P. H. S., Letter of March 17, 1915.
[22] P. H. S., Letter of November 1, 1911.

of lighthouse employees stationed on vessels or at light stations. This handbook treats of the prevention of disease and the care of the sick and injured with special reference to first aid to the injured. Medical chests that may be needed in emergency cases, with directions for their use, are furnished isolated vessels and stations by the Lighthouse Service.

Educational Aid. All lightships and inaccessible off-shore stations are provided with libraries. These libraries, first introduced into the service in 1876, consist of standard books suitable for the persons who use them. They consist largely of fiction, but also include other classes of literature in reasonable quantities, including, where desirable, books for children. Arrangements are made for the exchange of books at various intervals between stations and vessels.

Attention is also paid to the education of the children of light keepers, who are located at stations not accessible to schools. From time to time inquiry is made into the education of the children and, other things being equal, preference is given to employees having children between the ages of 5 and 16 years in filling vacancies by transfers at stations convenient to schools. In a number of instances, notably in Maine, traveling teachers have been provided by the state for the teaching of lighthouse keepers' children. The act of June 20, 1918 (40 Stat. L., 607, 608), contained provisions for the payment out of "General expenses, Lighthouse Service," under regulations prescribed by the Secretary of Commerce, of the traveling and subsistence expenses of teachers while actually employed by states or private persons in the instruction of children of lighthouse keepers. During the fiscal year ended June 30, 1925, thirty-six children benefited by the above law at a total cost of $1646. In addition, the State of Maine paid for the instruction of forty-three children of lighthouse keepers.

APPENDIX 1

OUTLINE OF ORGANIZATION

Explanatory Note

The Outlines of Organization in this series of monographs have for their purpose to make known in detail the organization and personnel possessed by the several services of the national government to which they relate. They have been prepared in accordance with the plan followed by the President's Commission on Economy and Efficiency in the preparation of its outlines of the organization of the United States government.[1] They differ from those outlines, however, in that whereas the Commission's report showed only organization units, the presentation herein has been carried far enough to show the personnel embraced in each organization unit.

This monograph gives this information in detail only as to the headquarters organization in Washington. A summary for the field establishment has been adapted from data for this branch of the service as published in The Budget, 1927 (pages 374-78).

These outlines are of value not merely as an effective means of making known the organization of the several services. If kept revised to date by the services, they constitute exceedingly important tools of administration. They permit the directing personnel to see at a glance the organization and personnel at their disposition. They establish definitely the line of administrative authority and enable each employee to know his place in the system. They furnish the essential basis for making plans for determining costs by organization division and subdivision. They afford the data for a consideration of the problem of classifying and standardizing personnel and compensation. Collectively, they make it possible to determine the number and location of organization divisions of any particular kind, as, for example, laboratories, libraries, blue print rooms, or any other kind of plant possessed by the

[1] House Doc. 458, 62d Congress, 2d Session, 1912, 2 vols.

national government, to what services they are attached and where they are located, or to determine what services are maintaining stations at any city or point in the United States. The Institute hopes that upon the completion of the present series it will be able to prepare a complete classified statement of the technical and other facilities at the disposal of the government. The present monographs will then furnish the details regarding the organization, equipment, and work of the institutions so listed and classified.

OUTLINE OF ORGANIZATION
LIGHTHOUSE SERVICE
DEPARTMENT OF COMMERCE
JUNE, 30, 1925

Units of Organization; Classes of Employees	*Number*	*Annual Salary Rate*
1. General Administration		
1. Office of the Commissioner		
Commissioner	1	$6,500
Secretary to Commissioner	1	1,920
Deputy Commissioner	1	5,800
2. Engineering Construction Division		
Chief Constructing Engineer	1	5,400
Assistant Engineer	1	3,800
Draftsman	1	2,200
	1	1,980
3. Marine Engineering Division		
Superintendent of Naval Construction	1	5,400
Assistant Engineer	1	4,000
Draftsman	1	3,000
	1	2,600
	1	1,860
Clerk	1	1,560
4. Hydrographic Division		
Assistant Engineer	1	3,300
	1	2,700
5. Office of the Chief Clerk		
1. Office proper of the Chief Clerk		
Chief Clerk (Administrative Assistant)	1	3,300
Clerk	1	1,860
	1	1,620
	1	1,320
Messenger	1	1,140
Assistant Messenger	1	1,080
Messenger Boy	1	600

2. Financial Division		
Chief	1	2,700
Assistant Chief	1	2,300
Clerk	1	1,620
	1	1,560
	2	1,300
	1	1,320
3. Law and Property Division		
Chief	1	2,700
Assistant Chief	1	1,920
Clerk	1	1,500
	1	1,440
	1	1,380
4. Personnel Division		
Chief	1	2,300
Assistant Chief	1	1,800
Clerk	1	1,440
5. Files Division		
Chief	1	1,920
Clerk	1	1,320
2. Field Establishment		
1. District Offices and Shops [1]		
Superintendent	1	[2] 5,800
	16	5,250
	3	3,800
Assistant Superintendent	2	3,450
	14	3,044
	14	2,773
Examiner	1	3,800
Radio Engineer	1	3,800
Assistant Engineer	1	2,800
Scientific Assistant	1	3,000
Chief Clerk	9	3,000
	7	2,871
Chemist	1	2,700
Assistant Chemist	1	2,400
General Storekeeper	1	3,000
Purchasing Agent	1	2,800
Chief Clerk and Assistant Superintendent	3	2,880
Draftsman	$1\frac{6}{12}$	2,400
	8	2,170

[1] Does not include Army officers acting as Superintendents in the three river districts.

[2] $200 deduction for quarters.

Clerk	4	2,315
	26	2,087
	$16\frac{4}{12}$	1,807
	15	1,613
	$18\frac{8}{12}$	1,518
	6	1,410
Traffic Clerk	2	2,080
Aid	1	1,860
Depot Keeper	3	2,300
	7	1,889
	7	1,785
	4	1,260
	1	300
Assistant Depot Keeper	2	1,740
	2	1,560
	1	1,440
Chief of Watch	1	1,560
Telegraph Operator	1	1,320
Messenger	2	1,380
	2	1,080
Messenger Boy	3	980
Janitor	1	1,380
Assistant Janitor	1	1,380
Watchman	11	1,303
Laborer	2	1,110
Boiler Maker (Assistant Foreman)	1	2,739
Boiler Maker (Leader)	4	2,304
Boiler Maker	27	2,139
Blacksmith (Foreman)	1	3,208
Blacksmith	15	1,911
Junior Blacksmith	3	1,753
Blacksmith's Helper	16	1,450
Boat Builder	9	1,879
Carpenter (Foreman)	2	2,705
Master Carpenter	2	1,842
Marine Carpenter	3	2,103
	50	1,874
Carpenter's Helper	1	1,352
Chauffeur	2	1,740
Concrete Worker	1	1,552
Radio Electrician	1	2,400
Electrician	3	2,292
Engineer	1	2,340
Assistant Engineer	4	2,040
Hoisting Engineer	1	2,040

Fireman	5	1,578
	24½	2,179
Helper	7	1,398
Laborer (Fireman)	1	2,269
Skilled Laborer	15	1,308
	6	805
Lamp Maker	7	2,107
Mason	4	2,181
Master Mechanic	2	3,048
Mechanician	11	2,302
General Mechanic	2	1,680
Machinist (Foreman)	1	3,052
Machinist (Assistant Foreman)	1	2,895
Marine Machinist (Leader)	2	2,304
Marine Machinist	7	2,178
Machinist (Leader)	2	2,304
Machinist	45	2,051
Junior Machinist	3	1,628
Machinist's Helper	6	1,386
Packer (Foreman)	1	1,680
Assistant, Packer	1	1,620
Packer	9	1,555
Painter	3	1,949
Pattern Maker	1	2,424
Pile Driver	1	2,040
Pipe Fitter	3	2,178
Plumber	1	2,329
Rivet Heater	5	1,352
Rivet Holder	25	1,442
Sailmaker	2	2,116
Sheet-metal Worker	1	2,040
Spar Buoy Maker	1	1,828
Spinner	3	2,245
Storeman	1	1,402
Tinsmith	3	2,178
Junior Tinsmith	1	1,803
Tinsmith's Helper	1	1,442
Tool Keeper	1	1,578
Welder, Arc	4	2,026
Welder, Gas	1	2,254
Junior Welder	1	1,793
Yardman	2	1,440
Temporary Laborer	..	.....

2. Light Keepers		
Lighthouse Keeper	15	1,585
	24	1,520
	38	1,430
	52	1,364
	97	1,284
	107	1,258
	181	1,195
	197	1,146
	200	1,098
	229	1,020
	137	1,058
	71	917
	18	896
Lamplighter	220	330
	1,727	174
Light Attendant	11	1,685
	16	1,250
Laborer in Charge of Lights	11	408
3. Lighthouse Vessels		
Captain	12	3,060
Master	2	3,000
	19	2,874
	11	2,575
	23	2,213
	$30\frac{6}{12}$	2,001
	35	1,887
	7	1,706
	3	1,580
	3	1,440
Master and Pilot	1	3,000
	1	2,520
	1	2,160
Chief Engineer	2	2,760
	9	2,593
Engineer	20	2,526
	25	2,182
	33	1,940
	9	1,760
	5	1,600
First Officer	1	2,100
	33	1,960
	8	1,800
	1	1,200
Second Officer	1	1,920
	$31\frac{6}{12}$	1,749

Assistant Engineer	47	1,934
	51	1,777
	10	1,548
Third Officer	1	1,740
Mate	12	1,755
	7	1,551
Radio Operator	1	1,800
	58	1,336
Quartermaster Carpenter	1	1,680
Yeoman	1	1,440
Steward	5	1,440
	28	1,167
	1	900
	2	810
	$\frac{9}{12}$	576
Cook	10	1,404
	26	1,168
	68	1,037
	$8\frac{9}{12}$	960
Ship Keeper	1	1,320
	1	840
Boatswain	1	1,320
	2	1,230
	16	911
Quartermaster	14	1,140
	$19\frac{9}{12}$	903
	74	838
Oiler	12	1,140
	$2\frac{9}{12}$	1,020
	20	912
	78	868
Seaman	1	1,020
	115	900
	$19\frac{9}{12}$	840
	414	749
Carpenter	1	1,020
Fireman	14	1,080
	$58\frac{9}{12}$	907
	$190\frac{6}{12}$	812
	20	711
Winchman	2	900
	1	840
Deck Hand	2	930
	5	840
	$11\frac{3}{12}$	720
Mess Attendant	$10\frac{6}{12}$	840
	80	612
	5	557

APPENDIX 2

CLASSIFICATION OF ACTIVITIES

Explanatory Note

The Classifications of Activities in this series have for their purpose to list and classify in all practicable detail the specific activities engaged in by the several services of the national government. Such statements are of value from a number of standpoints. They furnish, in the first place, the most effective showing that can be made in brief compass of the character of the work performed by the service to which they relate. Secondly, they lay the basis for a system of accounting and reporting that will permit the showing of total expenditures classified according to activities. Finally, taken collectively, they make possible the preparation of a general or consolidated statement of the activities of the government as a whole. Such a statement will reveal in detail, not only what the government is doing, but the services in which the work is being performed. For example, one class of activities that would probably appear in such a classification is that of "scientific research." A subhead under this class would be "chemical research." Under this head would appear the specific lines of investigation under way and the services in which they were being prosecuted. It is hardly necessary to point out the value of such information in planning for future work and in considering the problem of the better distribution and coördination of the work of the government. The Institute contemplates attempting such a general listing and classification of the activities of the government upon the completion of the present series.

Classification of Activities

1. Installation of New Aids to Navigation
   1. Planning and design of fixed structures on land

2. Planning and design of lightships and other floating equipment
2. Operation of Aids to Navigation on the Coasts and Rivers of the United States
   1. Operation of light stations proper
   2. Operation of lightships
   3. Maintenance of fog signals, including radio fog signals
   4. Maintenance of systems of buoyage
   5. Repair and upkeep of aids
3. Research and Manufacture
   1. Testing light and sound devices
   2. Radio adaptation
   3. Manufacture of special lighthouse apparatus
4. Miscellaneous Duties
   1. Supervising the lighting of bridges
   2. Supervising the operation of private aids
   3. Supervising and aiding in the marking of wrecks
   4. Enforcement of the laws for the protection of aids
5. Work for Other Government Agencies not included in above
   1. Meteorological observation for the Weather Bureau, made at selected stations
   2. Information of changes in shoals and channels furnished the Navy Department and other maritime services
6. Saving of Life and Property

APPENDIX 3

PUBLICATIONS[1]

Due both to its long history and to the increase of the physical properties for which it is responsible, the Lighthouse Service has been a prolific publisher of documents.

Annual Report. The Annual Report of the Commissioner of the Lighthouse Service has been issued since 1910. It is an administrative report, containing a general statement of the operations and cost of the service and a technical description of the more important works under construction or repair, estimates for the ensuing year, and legislative recommendations. This report is a continuation of the Annual Report of the Lighthouse Board, which were issued from 1852 to 1909.

Light Lists.[2] There are now six annual series of Light Lists, one for the Atlantic and Gulf coasts, one for the Northern lakes and rivers, one for the Pacific coast, and three for the Mississippi river and tributaries. The purpose of these lists is to furnish the necessary information regarding lighthouses, lighted beacons, lightships, lighted buoys, and fog signals for the use of mariners engaged in coastwise and transoceanic navigation. They show in tabular form and in geographical sequence, the name of each aid, the character and period of the light, the location of the structure (with the latitude and longitude of the more important aids), the height in feet of the light above high water, the distance in miles at which the light may be seen in clear weather, and the approximate candlepower of the light. In addition they give a brief description of the aids, including the characteristic blasts or strokes of the fog signals.

The Light Lists for the "Upper Mississippi River and Tributaries," the "Ohio River and Tributaries," and the "Lower Mis-

[1] Sold by the Superintendent of Documents, Government Printing Office, except as otherwise stated.

[2] Distributed free of charge for official use only by the Bureau; also sold by the Superintendent of Documents and by selling agencies at the principal ports. These agencies are listed in the weekly Notice to Mariners, in the first issue of each month.

sissippi and Tributaries" simply contain the name and number of the aid, the distance from some definite starting point, the side of the channel, and the color of the aid.

The first publication of this sort appears to have been "Lighthouses, beacons, and floating lights of United States," issued by the Treasury Department in 1839. This was issued in revised form by the Lighthouse Board in 1858. From 1869 on, lists have been issued each year, with a few exceptions, but the original series has been broken up into six regional lists. To trace the development of these separate series, would involve too much detail to be attempted here.

Buoy Lists.[3] Buoy Lists are published annually and separately for each district, excepting the thirteenth, fourteenth and fifteenth, the three river districts. The few buoys in operation in the river districts are included in the Light Lists. The Buoy Lists for the tenth, eleventh, and twelfth (the Great Lakes) districts, are combined in one volume.

These lists, which have been published since 1877, show all the buoys, both lighted and unlighted, as well as all other aids in operation in the district.[4]

Notice to Mariners. The weekly Notice to Mariners is issued jointly by the Lighthouse Service and the Coast and Geodetic Survey, and distributed free of charge by the Bureau to maritime organizations and others interested. It contains notices of all changes in aids to navigation, new dangers, changes in shoals and channels, revision of charts and Coast Pilots, corrections of published lists, and any similar items affecting the navigable waters under the jurisdiction of the Lighthouse Service.

This publication has passed through several stages of development. It began in 1891 and was issued irregularly until 1904, when it was combined with the Bulletin of recent changes in aids to navigation (also first issued in 1891) and issued weekly. During 1908 it included the monthly Notice to Mariners, a series which

[3] Distributed free of charge, for official use only, by the Bureau; also sold by the Superintendent of Documents and by selling agencies at the principal ports. These agencies are listed in the weekly Notice to Mariners, in the first issue of each month.

[4] The location and character of buoys and other aids with reference to their surroundings are shown on the larger scale maps of the Coast and Geodetic Survey and the Lake Survey.

had been issued by the Coast and Geodetic Survey; and from 1909 to date, it has been issued as a joint product.

Posters. Poster Notices to Mariners are issued as may be necessary, calling attention to the establishment of new aids to navigation and changes in existing aids of special importance. These notices are posted conspicuously for the information of mariners.

Lighthouse Service Bulletin. Since January, 1912, the Bureau of Lighthouses has had a monthly "house organ," designed to give information as to service or other matters to the scattered personnel. It is not intended for general distribution, but is furnished to those who have special interest in lighthouse work.

Regulations. Service regulations are issued from time to time in pamphlet form. Such are: Regulations of the United States Lighthouse Service (1918), provided for in the organic law; Civil service regulations for the Lighthouse Service (1913); and Regulations for lighting bridges over navigable rivers (1920).

Instructions. Beginning in 1852 the Lighthouse Board issued a number of pamphlets of Instructions to employees, the last number of which was published in 1902. The latest edition was issued by the Bureau of Lighthouses in 1915. The "Medical Handbook," issued in 1915, may also be mentioned under this head.

Laws and Regulations. Compilations of statutes and regulations governing the Lighthouse Service have been published at irregular intervals since 1852, the last edition being that of 1913.

Circulars. Lists of Lighthouse officers on duty were issued as Treasury Department Circulars prior to May, 1899. They were continued as Circulars of the Lighthouse Board until May, 1910.

Miscellaneous Publications. "Radio fog signals and their use in navigation in connection with the radio compass," by the Commissioner (the second edition of which appeared in 1924), and "United States Lighthouse Service," a history and description by the Deputy Commissioner (1915 and 1923), represent a type of publication which has been issued from the early days of the Service. Others are: The report of Jenkins and Bache, published as a Congressional document in 1846; Johnson's "Modern lighthouse service" (1889); Elliott's "European light-house establishments (1873), and other reports and translations relating to foreign systems.

APPENDIX 4

PLANT AND EQUIPMENT

The headquarters of the Bureau of Lighthouses are in the Hurley-Wright Building at Pennsylvania Avenue and Eighteenth Street, Northwest, Washington, D. C. The headquarters of the various districts are given in Chapter III. Because of the nature of the work, the plant and equipment of the Lighthouse Establishment is necessarily scattered all along the coast and river channels under the jurisdiction of the Service.

The following tables show in turn, by districts, the number and characteristics of the aids to navigation; the characteristics of lights (not including those on lightships); illuminants of light (not including lightships); location and characteristics of lightships; description of lights on lightships; number and characteristics of fog signals; name, number, and characteristics of tenders; name and location of lighthouse depots; number of private aids maintained and bridges lighted; and number and cost of aids maintained by contract. All of the equipment shown in these tables with the exception of the aids maintained by contract is the property of the United States. In addition there are certain reservations not at present being used by the Service.

TABLE 1.[1] AIDS TO NAVIGATION MAINTAINED BY THE LIGHTHOUSE SERVICE, JUNE 30, 1925

Class [2]	District																		
	1st	2d	3d	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	18th	19th	Total
LIGHTED AIDS																				
Hyperradiant lights	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1
First-order lights	1	5	5	1	8	8	6	3	.....	.....	.....	.....	.....	.....	.....	.....	9	9	.....	55
Second-order lights	7	3	2	.....	.....	2	1	2	1	.....	3	2	.....	.....	.....	.....	.....	1	2	26
Third-order lights	5	1	3	2	.....	3	3	8	6	3	10	9	.....	.....	.....	4	2	4	1	64
Three-and-one-half-order lights	.....	2	1	3	1	1	.....	3	1	3	6	2	.....	.....	.....	.....	.....	.....	1	24
Fourth-order lights	35	19	54	8	47	2	4	14	4	22	42	36	.....	.....	.....	5	18	20	7	337
Fifth-order lights	18	15	18	4	20	2	1	13	4	9	13	12	.....	.....	.....	.....	.....	2	.....	131
Sixth-order lights	1	4	19	2	8	.....	.....	.....	4	6	1	14	.....	.....	.....	.....	.....	.....	.....	59
Range-lens lights	.....	.....	10	15	5	11	.....	.....	.....	6	4	.....	.....	.....	.....	.....	3	.....	2	56
Reflector lights	2	9	2	10	21	38	13	12	3	7	28	3	.....	.....	.....	.....	5	.....	.....	153
Lens-lantern lights	12	36	107	28	29	64	25	214	19	47	123	58	.....	.....	.....	135	38	61	39	1,035
Minor lights	3	7	139	27	403	200	104	168	7	.....	63	4	366	600	845	110	374	30	1	3,451
Electric lights without lens	1	.....	.....	.....	.....	.....	.....	.....	5	.....	.....	.....	.....	.....	.....	3	4	1	2	16
Lightship stations	1	10	9	.....	5	4	.....	2	.....	.....	4	6	.....	.....	.....	.....	3	2	.....	46
Gas-lighted buoys	7	36	55	17	69	12	6	34	10	36	94	18	.....	.....	.....	8	13	12	29	456
Gas and whistling buoys	6	9	11	.....	11	10	5	.....	.....	.....	.....	1	.....	.....	.....	4	8	11	.....	84
Gas and aerial bell buoys	1	19	31	14	28	12	13	.....	.....	2	13	18	.....	.....	.....	7	7	9	1	183
Float lights	.....	.....	.....	.....	.....	.....	.....	.....	.....	22	4	5	102	35	.....	3	3	.....	.....	174
Total	100	175	466	131	655	369	181	489	64	163	408	188	468	635	845	279	487	162	86	6,351
Lights on fixed structures	85	101	360	100	542	331	157	437	54	103	293	140	366	600	845	257	453	128	56	5,408
Lights, floating	15	74	196	31	113	38	24	52	10	60	115	48	102	35	.....	22	34	34	30	943
Total lighted aids	100	175	466	131	655	369	181	489	64	163	408	188	468	635	845	279	487	162	86	3,351
UNLIGHTED AIDS																				
Fog signals, engine power	19	21	38	5	13	4	.....	5	.....	13	40	50	.....	.....	.....	12	26	31	.....	277
Fog signals, clock power	37	13	57	6	52	3	1	14	.....	5	1	7	.....	.....	.....	.....	9	6	.....	211
Fog signals, compressed gas	.....	.....	.....	.....	6	.....	.....	1	.....	.....	1	.....	.....	.....	.....	1	.....	1	.....	10
Fog signals, hand power	12	.....	1	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	14
Fog signals, electric	.....	6	7	1	5	.....	.....	.....	.....	1	7	.....	.....	.....	.....	.....	1	9	.....	37
Fog signals, radio	.....	2	4	.....	2	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	2	2	.....	13
Submarine signals	1	9	9	.....	6	5	.....	2	.....	.....	5	4	.....	.....	.....	.....	4	2	.....	47
Buoys, whistling (unlighted)	21	7	10	.....	3	6	2	5	1	.....	.....	.....	.....	.....	.....	.....	10	18	.....	83
Buoys, bell (unlighted)	51	32	62	3	39	10	4	10	5	1	1	2	.....	.....	.....	1	7	20	.....	248
Buoys, iron	142	64	454	101	320	296	174	186	120	21	25	25	.....	.....	.....	223	145	86	46	2,428
Buoys, spar (wood)	720	598	693	114	925	9	.....	223	.....	147	501	141	679	.....	.....	70	191	38	17	5,066
Day marks, beacons, etc	183	73	37	1	314	626	752	411	10	.....	4	8	281	82	.....	137	86	22	52	3,079
Total unlighted aids	1,186	825	1,372	231	1,685	959	933	857	136	188	587	237	960	82	.....	444	481	235	115	11,513
Grand total	1,286	1,000	1,838	362	2,340	1,320	1,114	1,346	200	351	995	425	1,428	717	845	723	968	397	201	17,864

[1] From Annual Report, 1925, p. 17.

[2] The table of aids to navigation includes all those maintained by the Lighthouse Service, a total of 17,864. In the statistics relief lightships and duplicate or auxiliary lights and fog signals are not counted, but double lights are counted separately when maintained on distinct structures or for distinct purposes. Buoys for the purpose of marking the positions of lightships or larger buoys are not counted. Fog signals at light stations or on ships are counted as separate aids but not those attached to buoys except in the case of submarine bells, which are counted as separate signals, whether on ships or on buoys. Otherwise each buoy is counted only once, and if it is included in a higher class it is not in the lower class. Lightship lights are not counted separately. On June 30, 1925, there were 1009 private aids to navigation maintained under authority of the act of June 20, 1906, as follows: Lights on fixed structures, 289; lighted buoys, 50; unlighted buoys, 566; fog signals, 37; other unlighted aids, 67. There were 1661 bridges

TABLE 2.[2] CHARACTERISTICS OF LIGHTS (NOT INCLUDING LIGHTSHIPS)[a]

	District															
	1st	2d	3d	4th	5th	6th	7th	8th	9th	10th	11th	12th	16th	17th	18th	19th	Total
Fixed white;																	
Sixth order and above	28	21	49	15	55	25	4	31	2	15	28	20	1	4	1	4	303
Below the sixth order	1	10	69	6	226	140	25	198	4	6	63	4	72	255	28	14	1,121
Lighted buoys	....	....	5	....	....	....	....	....	....	10	....	5	1	2	....	10	33
Fixed red;																	
Sixth order and above	14	7	23	....	16	22	9	9	2	17	26	24	....	4	....	5	178
Below the sixth order	5	14	96	7	101	81	18	154	8	15	62	14	12	129	29	13	758
Lighted buoys	....	....	5	....	....	....	....	....	....	12	2	....	2	1	....	5	27
Fixed green;																	
Sixth order and above	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1	....	2
Below the sixth order	....	....	....	....	....	....	....	....	1	1	1	....	....	....	....	....	3
Flashing or occulting;																	
Sixth order and above	17	18	37	30	39	21	15	12	15	22	48	22	8	26	35	7	372
Below the sixth order	9	26	81	42	103	41	85	23	18	24	56	42	163	32	27	27	799
Lighted buoys	13	64	87	31	108	34	24	50	9	39	109	37	20	28	32	15	700
Fixed and flashing, sixth order and above	11	5	6	....	3	3	1	2	3	3	9	14	....	3	....	....	63
Candlepower;																	
50,000 to 190,000	5	4	5	10	4	6	5	5	3	5	8	3	1	4	10	1	79
200,000 to 490,000	....	1	2	1	1	1	1	1	....	....	4	1	1	....	3	1	18
500,000 and over	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1	1	3
Twin light stations	.. ..	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2
Stations with resident keepers	70	40	100	29	71	21	13	48	16	37	63	60	12	34	40	8	662

ILLUMINANTS OF LIGHTS (NOT INCLUDING LIGHTSHIPS)[a]

	District															
	1st	2d	3d	4th	5th	6th	7th	8th	9th	10th	11th	12th	16th	17th	18th	19th	Total
Incandescent oil vapor	25	23	33	16	16	15	7	13	13	5	36	26	5	24	22	6	285
Oil (wick lamps):																	
Sixth order and above	43	16	62	3	56	40	11	29	5	28	22	28	1	2	....	3	349
Below the sixth order	6	11	148	5	328	221	44	323	....	12	62	12	82	366	51	14	1,685
Lighted buoys	....	....	....	....	....	....	....	....	1	22	2	5	2	3	....	....	35
Acetylene:																	
Sixth order and above	....	3	4	15	21	14	8	9	8	3	24	7	3	3	3	1	126
Below the sixth order	9	26	92	46	103	40	58	50	15	17	52	41	163	19	22	28	781
Lighted buoys	8	56	97	18	71	34	24	31	9	10	45	37	20	28	22	30	540
Oil gas:																	
Lights with mantles	....	....	....	....	1	....	....	....	....	....	46	....	....	....	....	....	47
Lighted buoys with mantles	2	....	....	13	36	....	....	....	....	33	64	....	....	....	9	....	157
Lighted buoys without mantles	6	8	....	....	....	....	....	19	....	....	....	....	....	....	1	....	34
Electric incandescent:																	
Sixth order and above	2	9	15	11	15	....	2	....	5	21	29	18	....	10	12	2	151
Below the sixth order	1	11	5	4	3	1	5	4	8	16	22	7	1	31	11	4	134
Gas (coal), sixth order and above	....	2	....	....	....	....	....	....	....	....	....	1	....	....	....	....	3
Gas (oil), below sixth order	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Five-day lens lanterns	5	4	7	2	11	37	6	113	....	9	15	5	3	7	26	12	262
Eight-day post lanterns	1	....	11	2	303	76	43	160	1	....	46	....	92	78	29	....	842

[a] Does not include the 13th, 14th, and 15th lighthouse (river) districts, in which there are, 1811 lights on fixed structures and 137 float lights, all of which use kerosene and are fixed, excepting 14, which use acetylene and are flashing, and 10 which use electricity.

[2] From Annual Report, 1925, p. 18.

TABLE 3.[8] LIGHTSHIPS IN COMMISSION, FISCAL YEAR 1925.

Number	Station	District	Tonnage or displacement	When built	Material of hull	Dimensions: Length over all	Dimensions: Breadth	Dimensions: Depth	Indicated horsepower (self-propelling)	Regular complement: Officers	Regular complement: Crew	Fog signal	Illuminant	Cost of repairs made during fiscal year	Cost of maintenance during fiscal year	Original cost	On station: Months	On station: Days
						Ft. in.	*Ft. in.*	*Ft. in.*										
74	Portland, Me. ⊙	1	[1] 495	1902	Wood	129 9	28 6	13 0	380	4	8	12" steam whistle [3]	Acet.	8,853	20,950	$88,896	8	25
5	Relief [8]	2	104	1855	do	[4] 81 6	21 6	9 0	(5)	2	7	10" air whistle	do	437	5,187		4	28
41	Handkerchief, Mass.	2	387	1876	do	120 6	26 9	11 0	(5)	3	6	First-class air siren [3]	do	73	12,856	33,000	11	20
42	Hen and Chickens, Mass.	2	410	1877	do	121 7	26 6	10 6	(5)	3	6	10" air whistle	Oil	51	13,448	40,796	12	0
47	Stone Horse Shoal, Mass.	2	[1] 470	1891	Comp.	120 10	26 6	11 0	(5)	4	7	12" steam chime whistle [3]	Acet.	5,507	19,487	60,000	7	14
49	Hedge Fence, Mass.	2	470	1890	do	120 10	27 0	14 0	(5)	4	6	First-class air siren [3]	do	680	12,363	57,900	9	19
54	Boston, Mass.	2	[1] 375	1892	Steel	118 10	26 0	14 0	150	4	7	do.[3] (R)	do	98	17,792	62,030	12	0
66	Cross Rip, Mass.	2	[1] 590	1896	Comp.	123 0	28 6	13 0	350	4	8	12" steam chime whistle [3]	do	298	21,449	69,282	10	11
73	Vineyard Sound, Mass. ⊙	2	[1] 693	1901	Steel	123 9	28 6	14 9	400	5	8	do.[3]	Oil	4,809	17,703	79,872	9	8
85	Relief ⊙	2	[1] 683	1907	do	135 5	29 0	14 9	380	5	9	do.[3] (R)	El. inc.	1,396	24,397	99,000	2	17
86	Great Round Shoal, Mass.	2	[1] 683	1907	do	135 5	29 0	14 9	380	4	8	do.[3]	Oil	697	19,198	99,000	11	0
90	Relief	2	[1] 685	1908	do	135 5	29 6	14 9	380	4	9	do.[3]	Oil and el. inc.	560	23,264	107,213	6	21
106	Nantucket Shoals, Mass. ⊙	2	[1] 775	1923	do	132 4	30 0	16 0	400	6	10	do.[3] (R) (os)	El. inc.	357	34,338	200,000	11	4
110	Pollock Rip, Mass. ⊙	2	775	1923	do	132 4	30 0	16 0	400	5	10	12" steam chime whistle [3]	do	1,309	23,824	200,000	10	0
11	Scotland, N. J.	3	320	1853	Wood	[4] 104 0	24 8	11 6	(5)	2	5	Bell	Acet. and oil.	265	10,369	13,462	11	15
13	Bartlett Reef, Conn.	3	155	1854	do	[4] 79 8	21 8	10 4	(5)	4	6	10" air whistle	Acet.	756	15,821	12,000	11	5
16	Relief	3	250	1854	do	[4] 103 6	22 6	11 0	(5)	2	3	First-class air siren, 10" whistle.[3]	do	1,007	7,643	28,084	10	22
23	Ram Island Reef, Conn.[8]	3	186	1857	do	[4] 94 2	24 0	9 0	(5)	2	5	Bell	do	17	8,524	7,500	9	4
39	Brenton Reef, R. I.	3	387	1875	do	119 6	26 9	13 0	(5)	4	6	10" and 6" air whistle [3]	do	1,840	16,550	42,200	10	12
44	Northeast End, N. J. ⊙	3	197	1882	Iron	115 6	25 0	10 6	(5)	5	8	First-class steam siren [3]	do	303	16,716	50,000	11	20
48	Cornfield Point, Conn.[8] ⊙	3	[1] 470	1891	Comp.	120 10	27 8	12 0	(5)	5	6	First-class air siren [3]	Acet. and oil.		15,000	52,780		
68	Fire Island, N. Y. ⊙	3	[1] 590	1897	do	122 10	28 6	14 6	350	5	10	12" steam chime wh.[3] (R)	Acet.	3,343	34,277	74,750	10	19
69	Overfalls, Del.	3	[1] 590	1897	do	122 10	29 6	14 6	350	4	10	do.[3]	do	1,589	19,753	79,500	5	0
78	Relief ⊙	3	[1] 668	1904	Steel	129 0	28 6	14 9	325	5	8	10" steam whistle [3] (R) steam siren and bell.	do	3,978	21,222	89,000	6	13

79	----do----⊙	3	[1] 668	1904	---do---	129	0	28	6	14	9	325	5	8	12" steam chime wh.[2]	---do---	4,129	19,167	89,030	[illegible]	10
87	Ambrose Channel, N. Y---⊙	3	[1] 683	1907	---do---	135	5	29	0	14	9	325	5	10	12" steam whistle [2] (R)	El. inc.	1,509	24,535	99,000	12	[illegible]
101	Relief [7]	3	[1] 360	1916	---do---	101	10	25	0	13	2	200	5	7	First-class air siren [3]	Acet	----------	----------	108,507	----------	----------
108	Five Fathom Bank, N. J---⊙	3	[1] 775	1923	---do---	132	4	30	0	16	0	400	5	10	12" steam chime wh.[2] (R)	El. inc.	1,335	25,420	200,000	9	4
52	Fenwick Island Shoal, Del.-⊙	5	[1] 375	1892	Iron	118	10	26	6	14	0	180	5	9	12" steam wh., air siren [2]	---do---	4,683	24,907	62,000	10	29
72	Relief	5	[1] 693	1900	Steel	123	6	28	6	14	0	350	5	10	12" steam chime wh.[2] (R)	---do---	1,303	22,516	89,000	6	25
80	Cape Charles, Va-------⊙	5	[1] 668	1904	---do---	129	0	28	6	14	9	350	5	10	-----do.[2]	---do---	8,332	28,496	85,000	10	15
91	Winter Quarter Shoal, Va---⊙	5	[1] 685	1908	---do---	135	5	29	0	14	9	400	5	10	-----do.[2]	---do---	6,089	30,613	107,213	11	2
105	Diamond Shoals, N. C-----⊙	5	[1] 825	1922	---do---	140	3	30	0	14	9	475	6	10	-----do.[2] (R)	---do---	1,645	28,022	437,404	11	0
107	Cape Lookout Shoals, N. C-⊙	5	[1] 775	1923	---do---	132	4	30	0	16	0	400	5	10	-----do.[2]	---do---	3,019	27,618	200,000	10	11
1	Savannah, Ga----------	6	[1] 228	1855	Wood	103	0	24	0	13	0	([4])	2	8	First-class air siren [3]	Oil	5,290	13,899	----------	7	1
53	Charleston, S. C----------	6	[1] 375	1892	Iron	119	0	26	6	14	0	135	5	9	12" steam whistle	Acet	4,024	20,792	61,538	10	11
84	Brunswick, Ga---------⊙	6	[1] 683	1907	Steel	135	5	29	0	14	9	325	5	10	-----do.[2]	---do---	1,881	22,275	99,000	12	0
94	Frying-Pan Shoals, N. C---⊙	6	[1] 670	1911	---do---	135	6	29	0	14	9	363	5	10	-----do.[2]	---do---	3,712	23,174	104,000	10	2
109	Relief---------⊙	6	[1] 775	1923	---do---	132	4	30	0	16	0	400	5	10	-----do.[2]	El. inc.	1,945	22,781	200,000	8	17
81	Heald Bank, Tex---------⊙	8	[1] 668	1904	---do---	129	0	28	6	14	9	325	5	8	-----do.[2]	Oil	3,836	20,619	90,000	9	0
102	South Pass, La----------	8	[1] 360	1916	---do---	101	10	25	0	13	2	200	4	7	First-class air siren [3]	Inc. o. v.	1,667	19,799	110,065	9	27
75	Lake St. Clair, Mich--------	11	160	1902	---do---	83	9	24	0	9	6	([5])	----------	----------	Bell	Acet	1,661	1,088	14,998	6	8
82	Relief----------	11	[5] 209	1912	---do---	95	2	21	0	10	0	90	4	3	10" steam whistle [3]	---do---	280	8,560	42,910	5	0
89	Martin Reef, Mich----------	11	[5] 205	1908	---do---	88	3	21	0	10	0	90	4	3	6" steam whistle [3]	Oil	106	8,576	37,560	8	3
96	Lake Huron, Mich---------⊙	11	[5] 170	1914	---do---	101	0	23	6	11	5	([5])	3	4	First-class air siren [3] (R)	El. inc.	2,282	7,620	71,292	5	15
99	Poe Reef, Mich----------	11	[5] 215	1920	---do---	91	8	22	0	10	7	125	4	3	10" steam whistle [3]	Acet	75	8,522	97,220	7	23
56	North Manitou Shoal, Mich--	12	130	1891	Wood	102	8	20	0	12	6	100	4	2	6" steam whistle [2]	Oil	----------	9,712	13,600	7	11
60	Eleven-Foot Shoal, Mich----	12	[5] 160	1893	---do---	87	2	21	6	10	0	([5])	3	3	10" steam whistle [3]	---do---	469	8,821	13,990	7	5
77	Peshtigo Reef, Wis----------	12	[5] 155	1906	Steel	75	0	21	6	[illegible]	3	([5])	2	3	8" air chime whistle	---do---	398	7,147	13,950	7	9
95	Milwaukee, Wis----------	12	[5] 368	1912	---do---	108	5	23	0	11	6	200	4	5	12" steam chime whistle	El. inc.	785	16,137	74,558	11	17
98	Lansing Shoal, Mich--------	12	[5] 195	1915	---do---	101	0	23	6	11	5	100	4	2	First-class air siren [3]	---do---	3,206	11,499	87,025	7	13
103	Grays Reef, Mich----------	12	[5] 310	1920	---do---	[illegible]	5	24	0	11	9	175	4	5	10" steam whistle [3]	Acet	2,342	13,425	161,074	7	14
67	Umatilla Reef, Wash-------⊙	17	450	1897	Comp.	122	7	28	6	13	0	200	5	11	12" steam whistle [2]	Oil	162	28,010	69,750	11	24
88	Columbia River, Oreg------⊙	17	[1] 683	1907	Steel	135	5	29	0	14	9	325	5	11	-----do.[3] (R)	---do---	3,510	22,660	90,000	9	5
92	Relief---------⊙	17	[1] 685	1908	---do---	135	5	29	0	14	9	400	3	5	-----do.[3] (R)	---do---	3,679	24,291	107,213	8	12
93	Swiftsure Bank, Wash-------⊙	17	[1] 685	1908	---do---	135	5	29	0	14	9	400	5	11	-----do.[3] (R)	---do---	344	30,198	107,213	9	10
70	San Francisco, Calif.------⊙	18	[1] 590	1897	Comp.	122	10	28	6	14	6	349	5	11	-----do.[3] (R)	El. inc.	2,809	24,761	79,000	7	21
76	Relief---------⊙	18	[1] 578	1904	Steel	129	6	28	8	14	4	380	3	5	-----do.[3] (R)	Oil	2,450	23,612	90,000	7	4
83	Blunts Reef, Calif.--------⊙	18	[1] 668	1904	---do---	129	0	28	6	14	9	380	5	11	-----do.[3] (R)	---do---	2,831	29,087	90,000	9	5

⊙ Equipped with radio.
(os) Equipped with submarine oscillator.
(R) Equipped with radio fog signal.
[1] Displacement (salt water).
[2] Submarine bell.
[3] Laid up.
[4] Length between perpendiculars.
[5] Sail.
[6] Surveyed and condemned, to be sold.
[7] Off station entire year.
[8] Displacement (fresh water.)
[9] No means of propulsion.

NOTE.—Lightships No. 4 and No. 9, which were condemned and sold during the year, were in commission part of the year. The cost of repairs and maintenance of these ships does nor appear in above list.

[6] From Annual Report, 1925, p. 20.

TABLE 4.[4] LIGHTS ON LIGHTSHIPS

	District										
	1st	2d	3d	5th	6th	8th	11th	12th	17th	18th	Total
Characteristics as to lights:											
1 fixed white light	..	1	..	..	..	..	1	3	..	..	5
2 fixed white lights	..	1	2	..	..	1	..	..	2	1	7
1 fixed white and 1 fixed red light	..	..	..	..	..	..	..	..	1	..	1
1 white flashing, or occulting, and 1 fixed red light	..	..	2	..	..	..	..	..	..	..	2
1 white light, flashing or occulting	1	8	5	5	4	1	3	3	..	1	31
Illuminants:											
Incandescent oil vapor	..	..	..	..	..	1	..	..	..	..	1
Acetylene	1	6	5	1	3	..	2	1	..	..	19
Oil (wick)	..	2	1	..	..	1	1	3	3	1	12
Oil (wick) and acetylene	..	..	1	..	..	..	..	..	..	..	1
Electric arc	..	..	1	..	..	..	..	..	..	..	1
Electric incandescent	..	2	1	4	1	..	1	2	..	1	12
Illuminating apparatus:											
Fourth order	..	..	..	1	1	1	..	1	..	..	4
Fifth order	..	..	..	..	1	..	..	..	..	..	1
Reflector	..	1	2	..	..	..	1	1	1	..	6
Reflector and lens lantern	..	..	2	..	..	..	..	..	..	..	2
Lens lantern	1	9	5	4	2	1	3	4	2	2	33

[4] From Annual Report, 1925, p. 19.

TABLE 5.[5] FOG SIGNALS

Kind and how operated	District														
	1st	2d	3d	4th	5th	6th	7th	8th	10th	11th	12th	16th	17th	18th	Total
Radio	..	2	4	..	2	..	..	..	..	1	..	..	2	2	13
Steam:															
Whistle	5	7	6	..	3	2	..	1	2	22	27	..	3	5	83
Siren	..	..	1	..	..	..	..	..	..	..	..	..	1	1	3
Air:															
Whistle	2	2	1	..	..	..	..	..	..	..	3	..	..	1	9
Siren	2	5	22	1	5	1	..	1	3	8	9	4	6	15	82
Diaphone	2	1	...	1	2	1	..	3	8	10	9	5	2	9	53
Siren (electric)	..	..	...	1	..	..	..	..	1	4	..	..	1	9	16
Reed horn	8	6	8	3	3	..	..	..	..	..	..	3	14	..	45
Submarine bells:															
On lightships driven by compressed air	1	7	7	..	5	3	..	2	..	3	4	..	3	2	37
On bottom, electric power	..	..	...	..	..	..	..	..	..	1	..	..	..	..	1
On buoys, operated by sea	..	1	2	..	1	2	..	..	..	..	..	..	1	..	7
Submarine oscillator	..	1	...	..	..	..	..	..	..	1	..	..	..	..	2
Bell:															
Clockwork	37	13	57	6	52	3	1	14	5	1	8	..	9	6	212
Electric	..	6	7	..	4	..	..	..	..	3	..	..	..	.	20
Operated by gas	..	..	1	..	6	..	..	1	..	1	..	1	..	1	11
Hand	12	..	1	..	..	..	..	..	..	..	..	..	..	..	13
Horn:															
Hand	..	..	...	..	..	..	..	..	..	1	1	..	..	..	2
Total	69	51	117	12	83	12	1	22	19	56	61	13	42	51	[a]609

[a] Auxiliary fog signals (80), buoys with whistles (167), and buoys with bells (431) are not included.

[5] From Annual Report, 1925, p. 19.

TABLE 6.[a] LIGHTHOUSE TENDERS IN COMMISSION, FISCAL YEAR 1925

Name	District	Displacement: Light [1]	Displacement: Loaded [2]	When built	Description	Material of hull	Dimensions: Length over all	Dimensions: Breadth	Dimensions: Depth	Mean draft: Light [1]	Mean draft: Loaded [2]	Indicated horsepower	Regular complement: Officers	Regular complement: Crew	Miles steamed	Coal consumed for all purposes	Cost of repairs	Cost of maintenance	Original cost
		Tons	*Tons*				*Feet*	*Feet*	*Feet*	*Ft. in.*	*Ft. in.*								
Hibiscus ⊙	1	818	1,081	1908	Steamer, twin screw	Steel	190	30	16	11 0	13 3	1,000	7	27	12,609	2,042	$6,411	$64,562	$184,643
Ilex ⊙	1	870	1,130	1919	do	do	172	32	17	9 0	10 9	1,040	6	22	5,535	[3] 7,989	9,017	51,185	540,000
Anemone C ⊙	2	818	1,053	1908	do	do	190	30	16	11 0	13 0	1,000	7	27	12,664	1,975	5,430	62,874	191,999
Azalea ⊙	2	330	516	1891	Steamer, single screw	do	154	25	12	6 6	9 0	400	6	22	8,802	985	2,420	46,518	79,792
Lotus ⊙	2	870	1,130	1919	Steamer, twin screw	do	172	32	17	9 3	11 6	1,040	6	22	4,603	[3] 6,060	1,513	50,352	540,000
Shrub	2	362	435	1912	Steamer, single screw	Wood	106	29	13	6 5	6 9	300	2	13	4,843	485	1,721	27,006	42,000
Daisy	3	61	84	1892	do	do	80	14	5	4 0	5 0	60	2	5	3,053	155	622	11,982	6,500
Larkspur C ⊙	3	738	888	1903	Steamer, twin screw	Steel	169	30	14	9 1	10 6	750	7	25	9,798	1,540	2,839	51,920	123,259
Oak	3	800	950	1921	Steamer, single screw	do	160	35	14	6 6	9 0	700	4	23	8,853	1,158	624	43,695	378,510
Hawthorn	3	800	950	1921	do	do	160	30	14	6 6	9 0	700	4	23	7,003	1,222	740	45,655	378,352
Pansy	3	431	454	1878	Steamer, twin screw	Iron	152	25	11	7 7	7 11	250	4	18	4,653	565	9,921	37,657	48,739
Tulip C ⊙	3	774	1,142	1908	do	Steel	190	30	16	10 7	13 9	1,000	7	28	16,974	2,021	5,883	63,091	191,658
Spruce C ⊙	3	870	1,130	1919	do	do	172	32	17	9 3	11 6	1,040	4	24	9,234	[3] 8,401	3,256	56,837	540,000
Elm	3	259	318	1918	Oil, single screw	Wood	101	30	9	5 6	6 9	150	2	4	1,864	[4] 4,652	3,144	14,189	93,638
Pine	3	55	56	1918	Gasoline, single screw	do	61	15	6	4 3	4 4	50	2	3	2,409	[5] 1,704	1,272	9,584	16,187
Iris	4	519	606	1897	Steamer, single screw	Steel	153	30	10	8 7	9 10	800	5	21	11,086	1,139	6,642	39,186	84,407
Woodbine	4	85	107	1913	do	Wood	95	16	7	5 2	5 11	135	2	6			32,847	7,149	24,728
Mayflower C ⊙	5	630	668	1897	Steamer, twin screw	Steel	164	30	12	7 9	8 1	650	6	24	9,855	1,599	2,381	53,607	74,872
Holly	5	431	499	1881	Steamer, side wheel	Comp	176	24	10	7 0	8 6	400	5	18	10,169	785	5,001	38,428	41,911
Juniper	5	125	146	1903	Steamer, twin screw	Steel	95	18	8	4 6	5 0	290	4	8	7,113	518	3,392	22,092	29,425
Laurel	5	218	299	1915	Steamer, single screw	Wood	105	22	9	6 1	6 10	160	4	12	10,430	499	2,842	26,334	55,502
Maple ⊙	5	567	799	1893	Steamer, twin screw	Steel	164	30	12	7 3	9 5	650	7	25	7,153	770	49,020	50,065	93,389
Orchid C ⊙	5	818	1,081	1908	do	do	190	30	16	11 0	13 3	1,000	7	29	13,774	1,843	11,008	61,283	186,151
Speedwell ⊙	5	1,110	1,320	1919	do	do	172	32	17	11 4	13 0	1,040	7	23	12,804	[3] 9,668	10,380	62,827	540,000
Cypress ⊙	6	790	1,080	1908	do	do	190	30	16	11 0	12 0	1,000	7	28	12,811	1,562	9,553	63,522	191,633
Mangrove ⊙	6	606	821	1897	do	do	164	30	12	7 2	8 6	550	7	24	14,548	1,712	7,656	56,764	74,998
Palmetto	6	156	170	1917	Gasoline, twin screw	do	90	22	8	3 9	4 0	150	4	8	4,164	[5] 11,020	4,077	20,453	27,687
Water Lily	6	29	39	1895	do	Wood	64	11	5	3 3	3 8	50	2	3	3,815	[5] 2,915	502	8,504	9,261
Ivy ⊙	7	736	916	1904	Steamer, twin screw	Steel	173	30	13	8 5	9 6	700	7	22	8,409	1,628	3,262	58,824	123,860
Poinsettia	7	27	31	1915	Gasoline, single screw	Wood	50	16	6	2 5	2 9	50	2	3	2,627	[5] 5,008	2,060	7,764	6,550

Sundew	7	580	710	1919	Steamer, single screw	do	93	24	13	9 3	11 0	300	2	3	4,914	461	1,575	20,769	115,800
Camellia	8	276	377	1911	Steamer, twin screw	Steel	117	24	10	5 10	7 7	239	4	17	7,101	892	6,838	35,351	57,412
Magnolia C ⊙	8	685	877	1904	do	do	173	30	13	7 6	9 2	760	7	25	13,352	2,039	3,279	58,413	124,874
Sunflower	8	806	1,246	1907	do	do	174	31	15	9 8	12 2	900	7	27	8,234	1,544	19,122	63,213	124,958
Cosmos	8	57	61	1909	Gasoline, twin screw	Wood	75	15	6	3 9	4 0	100	2	3	6,662	[4] 10,624	1,237	10,466	
Aster	8	64	109	1921	do	do	75	21	7	3 8	5 7	70	2	6	4,174	[5] 5,052	875	13,136	19,909
Columbine ⊙	9	429	643	1892	Steamer, single screw	Steel	155	27	15	9 6	12 3	800	3	5	7,855	634	5,058	47,353	92,125
Crocus C	10	[6] 681	1,035	1904	Steamer, twin screw	do	165	29	14	9 6	12 3	700	5	23	6,860	1,279	5,854	44,597	119,718
Amaranth C ⊙	11	[6] 597	975	1892	Steamer, single screw	do	166	28	14	8 6	12 6	672	6	20	12,048	1,300	2,116	32,357	74,994
Aspen	11	[6] 353	415	1906	do	do	126	25	12	7 3	8 3	440	4	10	9,589	607	857	18,262	70,573
Clover	11	[6] 163	205	1899	do	Wood	93	22	7	5 4	6 4	140	4	8	8,893	410	261	15,703	
Marigold ⊙	11	[6] 477	696	1890	do	Iron	160	27	12	8 5	11 0	550	6	20	10,872	1,089	862	31,213	84,871
Hyacinth ⊙	12	[6] 493	914	1903	do	Steel	165	28	14	7 0	11 6	768	6	20	9,589	1,674	6,571	50,948	115,000
Sumac ⊙	12	[6] 600	887	1903	Steamer, twin screw	do	169	30	13	8 10	11 9	700	6	23	7,790	1,509	6,054	53,410	114,992
Dandelion	13	[6] 232	302	1893	Steamer, stern wheel	Wood	140	31	5	2 6	3 3	500	4	15	9,897	1,516	3,552	23,682	23,174
Greenbrier	14	302	335	1924	do	Steel	164	30	5	8 4	4 0	350	2	13	5,682	893	2,198	21,233	128,000
Oleander	15	[6] 463	548	1903	do	do	189	34	7	3 6	4 6	600	5	16	16,577	2,793	2,870	46,028	60,000
Fern ⊙	16	245	317	1915	Steamer, single screw	Wood	112	22	10	7 1	8 6	300	5	12	14,582	[3] 3,279	511	39,878	62,100
Cedar C ⊙	16	1,245	1,970	1917	do	Steel	201	36	18	9 6	14 0	1,150	8	26	16,715	[3] 14,395	5,014	95,766	248,189
Heather ⊙	17	631	831	1903	do	do	179	28	15	9 6	11 6	685	7	20	9,428	1,405	3,993	53,803	118,568
Manzanita ⊙	17	774	1,000	1908	Steamer, twin screw	do	190	30	16	10 7	12 7	1,000	7	24	9,244	1,740	5,908	68,678	211,817
Rose ⊙	17	395	567	1916	do	do	127	24	11	7 0	9 4	330	5	16	8,331	[3] 5,142	4,366	40,369	92,135
Madrono C ⊙	18	654	806	1885	Steamer, single screw	Iron	180	27	15	9 9	11 6	750	7	21	8,393	1,086	6,059	56,484	87,372
Sequoia [7] C ⊙	18	809	1,100	1908	Steamer, twin screw	Steel	190	30	16	10 11	13 5	1,000	7	24	10,297	703 / [6] 4,018	20,661	62,015	213,499
Kukui ⊙	19	838	935	1908	do	do	190	30	16	10 11	13 6	1,000	6	24	4,956	918	3,278	58,025	213,880

⊙ Equipped with radio.
C Radiocompass.
[1] Light=without cargo and deck loads, and a minimum supply of stores, provisions, water, and coal or oil.
[2] Loaded=bunkers or fuel-oil tanks full, all tanks, including trimming tanks, full; full stores and provisions, and an average maximum cargo and deck load.
[3] Barrels of fuel oil. 1 barrel=42 gallons.
[4] Gallons kerosene.
[5] Gallons gasoline.
[7] Changed from coal burning to oil burning December, 1924, amount of each type of fuel given separate.

NOTE.—In addition to the above there are 9 small vessels without regular complements and attached to depots: Poppy, 61 feet long, seventh district; Primrose, 31 feet; Birch, 40 feet, tenth district; Buttercup, 25 feet; Forgetmenot, 41 feet, eleventh district; Bluebell, 42 feet; Alder, 72 feet, sixteenth district; Yerba Buena, 42 feet, eighteenth district; Lehua, 30 feet, nineteenth district. Vessels in commission part of the year, and later sold were Zizania, Arbutus, Lilac, and Goldenrod.

[6] From Annual Report, 1925, p. 22.

TABLE 7.[7] LIGHTHOUSE DEPOTS, JUNE 30, 1925

District[a]	Location	District[a]	Location
1st.....	Bear Island, Me.	8th	Fort San Jacinto, Galveston, Tex.
	LITTLE DIAMOND ISLAND, ME.		Mobile, Ala.
2d	CHELSEA, MASS.		PORT EADS, LA.
	Woods Hole, Mass.	9th	SAN JUAN, P. R.
3d	Atlantic City, N. J.	10th	BUFFALO, N. Y.
	Goat Island, R. I.		Erie, Pa.
	Juniper Island, Vt.		Maumee Bay, Ohio.
	New London, Conn.		Rock Island, N. Y.
	STATEN ISLAND, N. Y.		Sandusky Bay (Cedar Point), Ohio.
	Tucker Beach, N. J.	11th	DETROIT, MICH.
4th	EDGEMOOR, DEL.		Minnesota Point, Minn.
	Lewes, Del.		St. Marys River, Mich.
5th	Annapolis, Md.	12th	Charlevoix, Mich.
	Lazaretto Point, Md.		MILWAUKEE, WIS.
	Point Lookout, Md.	16th	KETCHIKAN, ALASKA.
	PORTSMOUTH, VA.	17th	Ediz Hook, Wash.
	Washington Wharf, D. C.		TONGUE POINT, ORE.
	Washington, N. C.	18th	GOAT ISLAND, CAL.
	Coinjock Cut, N. C.	19th	HONOLULU, HAWAII.
6th	CHARLESTON, S. C.		
7th	Egmont Key, Fla.		
	KEY WEST, FLA.		

[a] Capitals indicate principal depots in each district.

TABLE 8.[8] PRIVATE AIDS TO NAVIGATION AND BRIDGES LIGHTED, JUNE 30, 1923

District	Lights other than bridges	Buoys		Other unlighted aids	Fog signals	Total private aids	Number of bridges lighted
		Lighted	Unlighted				
1st	....	....	31	1	....	32	21
2d	39	2	53	7	....	101	73
3d	38	8	109	4	2	161	221
4th	....	....	2	....	....	2	17
5th	19	1	166	4	....	190	161
6th	7	8	10	....	....	25	54
7th	3	....	9	5	....	17	33
8th	20	....	24	11	....	55	418
9th	....	....	1	....	....	1	0
10th	27	2	2	1	1	35	60
11th	12	1	54	1	....	68	57
12th	31	2	9	....	8	50	198
13th	....	1	....	....	....	1	81
14th	....	....	....	....	....	....	190
15th	3	....	....	....	....	3	8
16th	2	....	1	....	....	3	0
17th	1	....	19	....	4	24	56
18th	27	....	6	5	23	61	33
19th	15	....	2	....	....	17	0
Total	244	25	498	39	38	844	1,681

[7] From Annual Report, 1925, p. 15.

[8] From Annual Report, 1923, p. 35. Later figures not published. (1925 figures approximately the same.)

TABLE 9.[9] AIDS MAINTAINED UNDER CONTRACT DURING FISCAL YEAR 1923

District	Name of aids	Annual cost
1st.....	Kennebunkport Pier Light, Me.....	$150
5th	Curtis Bay Range Lights, Md. (2).....	222
	Edenton Harbor Range Lights, N. C. (2).....	100
	Cape Charles City Harbor Northern Light, Va.... } Cherrystone Inlet Channel Range Rear Light, Va. } North Jetty Light, Va..... }	*25
7th	Caximbas Pass and Big Marco Pass, Fla. (4 buoys).....	60
	Miami Municipal Channel, Fla. (5 buoys).....	72
10th	Lake Ontario and the St. Lawrence River, N. Y. (40 buoys).....	3,000
11th	Superior Bay, St. Louis Bay and River, Wis. and Minn. (34 lights)	3,300
16th	St. Michael Canal and Apoon Pass, Alaska (32 buoys); Orizaba Reef Bell Buoy and Norton Sound (11 lights).....	1,316
	Sitka Harbor Light, Alaska.....	60
19th	The Hook Buoy, Midway Island.....	100

* For the three lights.

[9] From Annual Report, 1923, p. 35. Later figures not published. (1925 figures approximately the same.)

APPENDIX 5

LAWS

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1789—Act of August 7, 1789 (1 Stat. L., 53)—An Act For the establishment and support of Lighthouses, Beacons, Buoys and Public Piers.[1]

[Section 1]. That all expenses which shall accrue from and after the fifteenth day of August, one thousand seven hundred and eighty-nine, in the necessary support, maintenance and repairs of all lighthouses, beacons,

[1] See act of July 22, 1790; act of March 3, 1791; act of March 2, 1793; act of March 2, 1795; act of May 30, 1796. Few acts have been specially passed since 1796 for the support, etc., of lighthouses, etc. Provision for

buoys and public piers erected, placed, or sunk before the passing of this act, at the entrance of, or within any bay, inlet, harbor, or port of the United States, for rendering the navigation thereof easy and safe, shall be defrayed out of the treasury of the United States: *Provided nevertheless*, That none of the said expenses shall continue to be so defrayed by the United States, after the expiration of one year from the day aforesaid, unless such lighthouses, beacons, buoys and public piers, shall in the mean time be ceded to and vested in the United States, by the state or states respectively in which the same may be, together with the lands and tenements thereunto belonging, and together with the jurisdiction of the same.

SEC. 2. That a lighthouse shall be erected near the entrance of the Chesapeake Bay, at such place, when ceded to the United States in manner aforesaid, as the President of the United States shall direct.

SEC. 3. That it shall be the duty of the Secretary of the Treasury to provide by contracts, which shall be approved by the President of the United States, for building a lighthouse near the entrance of Chesapeake Bay, and for rebuilding when necessary, and keeping in good repair, the lighthouses, beacons, buoys, and public piers in the several States, and for furnishing the same with all necessary supplies; and also to agree for the salaries, wages, or hire of the person or persons appointed by the President, for the superintendence and care of the same.

1795—Act of March 2, 1795 (1 Stat. L., 426)—An Act Relative to cessions of jurisdiction in places where lighthouses, beacons, buoys and public piers have been, or may hereafter be erected and fixed.

[SECTION 1]. That where cessions have been, or hereafter may be made, by any state, of the jurisdiction of places, where lighthouses, beacons, buoys or public piers have been erected and fixed, or may, by law, be provided to be erected or fixed, with reservation, that process civil and criminal, issuing under the authority of such state, may be executed and served therein, such cessions shall be deemed sufficient, under the laws of the United States providing for the supporting or erecting of lighthouses, beacons, buoys, and public piers.

SEC. 2. That where any state hath made, or shall make a cession of jurisdiction, for the purposes aforesaid, without reservation, all process civil and criminal, issuing under the authority of such state, or the United States, may be served and executed within the places, the jurisdiction of which has been so ceded, in the same manner, as if no such cession had been made.[2]

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the same has been made in the general appropriation laws. By Section 7 of the act of May 15, 1820, "No lighthouse, beacon nor landmark shall be built or erected on any site previous to the cession of jurisdiction over the same being made to the United States."

[2] Sec. 3 of the act of April 28, 1828 (4 Stat. L., 264)—That the President of the United States, in all cases where lands have been conveyed for the United States to individuals or officers, be authorized to obtain from the person or persons to whom the conveyance has been made, a release of their interest to the United States.

The act of August 1, 1888 (25 Stat. L., 357)—An Act To authorize condemnation of land for sites of public buildings, and for other purposes.

R. S., Sec. 223—Telegraph-lines connecting signal stations.

SEC. 223. The Secretary of War is authorized to establish signal-stations at light-house and at such of the life-saving stations on the lake or sea-coast as may be suitably located for that purpose, and to connect the same with such points as may be necessary for the proper discharge of the signal-service by means of a suitable telegraph-line in cases where no lines are in operation, to be constructed, maintained, and worked under the direction of the Chief Signal-Officer of the Army, or the Secretary of War and the Secretary of the Treasury; and the use of the life-saving stations as signal-stations shall be subject to such regulations as may be agreed upon by said officials.[8]

R. S., Sec. 355—Title to land to be purchased by the United States.

SEC. 355. No public money shall be expended upon any site or land purchased by the United States for the purposes of erecting thereon any armory, arsenal, fort, fortification, navy-yard, custom-house light-house, or other public building, of any kind whatever, until the written opinion of the Attorney-General shall be had in favor of the validity of the title, nor until the consent of the legislature of the State in which the land or site may be, to such purchase, has been given. The district attorneys of the United States, upon the application of the Attorney-General, shall furnish any assistance or information in their power in relation to the titles of the public property lying within their respective districts. And the Secretaries of the Departments, upon the application of the Attorney-General, shall procure any additional evidence of title which he may deem necessary, and which may not be in the possession of the officers of the Government, and

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[SECTION 1]. That in every case in which the Secretary of the Treasury or any other officer of the Government has been, or hereafter shall be, authorized to procure real estate for the erection of a public building or for other public uses he shall be, and hereby is, authorized to acquire the same for the United States by condemnation, under judicial process, whenever, in his opinion it is necessary or advantageous to the Government to do so, and the United States circuit or district courts of the district wherein such real estate is located, shall have jurisdiction of proceedings for such condemnation, and it shall be the duty of the Attorney-General of the United States, upon every application of the Secretary of the Treasury, under this act, or such other officer, to cause proceedings to be commenced for condemnation, within thirty days from the receipt of the application at the Department of Justice.

SEC. 2. The practice, pleadings, forms and modes of proceeding in causes arising under the provisions of this act shall conform, as near as may be, to the practice, pleadings, forms and proceedings existing at the time in like causes in the courts of record of the State within which such circuit or district courts are held, any rule of the court to the contrary notwithstanding.

[8] Modified by the acts of October 1, 1890 (26 Stat. L., 653), February 14, 1903 (32 Stat. L., 829), and March 4, 1913 (37 Stat. L., 736).

the expense of procuring it shall be paid out of the appropriations made for the contingencies of the Departments respectively.[4]

R. S., Sec. 4661—Cession of jurisdiction requisite.

SEC. 4661. No light-house, beacon, public piers, or landmark, shall be built or erected on any site until cession of jurisdiction over the same has been made to the United States.

R. S., Sec. 4674—Discontinuance and re-establishment of lights.

SEC. 4674. The Secretary of the Treasury may, upon the recommendation of the Light-House Board, discontinue from time to time such lights as may from any cause become useless or unnecessary. And he may, upon the like recommendation, from time to time re-establish any lights which have been thus discontinued, whenever he believes such re-establishment to be required by public convenience or the necessities of trade or commerce.[5]

1850—Act of September 28, 1850 (9 Stat. L., 500, 504)—An Act Making appropriations for Lighthouses, Light-Boats, Buoys, etc., and providing for the erection and establishment of the same, and for other purposes.

* * * *

SEC. 6. That hereafter all buoys along the coast, or in bays, harbors, sounds, or channels, shall be colored and numbered, so that passing up the coast or sound, or entering the bay, harbor, or channel, red buoys with even numbers shall be passed on the starboard hand, black buoys with uneven numbers on the port hand, and buoys with red and black stripes on either hand. Buoys in channel ways to be colored with alternate white and black perpendicular stripes.

1852—Act of August 31, 1852 (10 Stat. L., 112, 120)—An Act Making appropriations for light-houses, light-boats, buoys, etc., and providing for the erection and establishment of the same, and for other purposes.

* * * *

. . . *Provided,* That no additional salary shall be allowed to any civil, military, or naval officer who shall be employed on the Light-house Board,

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[4] The act of March 2, 1889 (25 Stat. L., 939, 941)—An Act Making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, eighteen hundred and ninety, and for other purposes. That hereafter all legal services connected with the procurement of titles to site for public buildings, other than for life saving stations and pier-head lights, shall be rendered by United States district attorneys; *Provided further,* That hereafter, in the procurement of sites for such public buildings, it shall be the duty of the Attorney-General to require of the grantors in each case to furnish, free of all expenses to the Government, all requisite abstracts, official certifications, and evidences of title that the Attorney-General may deem necessary.

[5] Modified by the acts of February 14, 1903 (32 Stat. L., 829), June 17, 1910 (36 Stat. L., 534), and March 4, 1913 (37 Stat. L., 736).

or who may be in any manner attached to the light-house service of the United States under this act: *And provided further,* That it shall not be lawful for any member of the Light-house Board, inspector, light-keeper, or other person in any manner connected with the light-house service, to be engaged either directly or indirectly in any contract for labor, materials, or supplies for the light-house service, nor to possess either as principal or agent any pecuniary interest in any patent, plan, or mode of construction or illumination, or in any article of supply for the light-house service of the United States.[6]

1854—Act of December 14, 1854 (10 Stat. L., 597)—An Act For the better preservation of life and property from vessels shipwrecked on the coasts of the United States.

* * * *

SEC. 4. That the Secretary of the Treasury be, and he is hereby, authorized to establish [life-saving] stations at such light-houses as, in his judgment, he shall deem best, and the keepers of such lights shall take charge of such boats and apparatus as may be put in their charge respectively, as a part of their official duties.

1859—Act of March 3, 1859 (11 Stat. L., 423, 424)—An Act Making appropriations for light-houses, light-boats, buoys, etc., and providing for the erection and establishment of the same, and for other purposes.

* * * *

SEC. 2. That hereafter whenever any of the light-vessels occupying positions which are adapted to the erection of light-houses upon pile foundations require to be rebuilt, or such extensive repairs as to render the substitution of such light-houses advisable and practicable, then such permanent structures are authorized to be erected in place of any such light-vessels: *Provided,* That the expense arising from all such changes and erections shall be defrayed from the general annual appropriations for repairs, etc., of light-vessels, unless special appropriations should be made for any such change.

1868—Act of March 2, 1868 (15 Stat. L., 249)—A Resolution Authorizing the Lighthouse Board to place warnings over obstructions at the entrance of harbors, or in the fairway of bays and sounds, and for other purposes.

[SECTION 1]. That the lighthouse board be, and they are hereby, authorized, when in their judgment, it is deemed necessary, to place a light-vessel, or other suitable warning of danger, on or over any wreck or temporary obstruction to the entrance of any harbor, or in the channel or fairway of any bay or sound.[7]

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[6] Modified by act of June 17, 1910 (36 Stat. L., 534). This act created the Lighthouse Board.

[7] Modified June 17, 1910 (36 Stat. L., 534).

1870—Act of July 15, 1870 (16 Stat. L., 291, 309)—An Act Making appropriations for sundry civil expenses of the Government for the year ending June thirty, eighteen hundred and seventy-one, and for other purposes.

* * * *

SEC. 3. That the Secretary of the Treasury be, and he is hereby, directed to authorize the lighthouse board to properly mark all pier-heads belonging to the government on the northern or northwestern lakes, when completed or repaired, and duly notified of such completion or repairs by the department in charge of such construction or repairs.[8]

1874—Act of June 20, 1874 (18 Stat. L., 85, 110)—An Act Making appropriations for the legislative, executive, and judicial expenses of the Government for the year ending June thirtieth, eighteen hundred and seventy-five, and for other purposes.

* * * *

SEC. 5. That from and after the first of July, eighteen hundred and seventy-four, and of each year thereafter, the Secretary of the Treasury shall cause all unexpended balances of appropriations which shall have remained upon the books of the Treasury for two fiscal years to be carried to the surplus fund and covered into the Treasury: *Provided,* That this provision shall not apply to permanent appropriations, . . . light-houses, . . . but the appropriations named in this proviso shall continue available until otherwise ordered by Congress.[9]

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[8] Modified by the acts of February 14, 1903 (32 Stat. L., 829), June 17, 1910 (36 Stat. L., 534), and March 4, 1913 (37 Stat. L., 736).

[9] 1874—Act of June 23, 1874 (18 Stat. L., 275)—An Act To authorize the Secretary of the Treasury to suspend work upon the public buildings.

. . . all moneys heretofore appropriated for the construction of public buildings and now remaining to the credit of the same on the books of the Treasury Department, or which may hereafter be appropriated for such buildings, shall remain available until the completion of the work for which they are, or may be, appropriated; and upon the final completion of each or any of said buildings, and the payment of all outstanding liabilities therefor, the balance or balances remaining shall be immediately covered into the Treasury.

1912—Act of August 24, 1912 (37 Stat. L., 417, 487)—An Act Making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, nineteen hundred and thirteen, and for other purposes.

* * * *

SEC. 7. No specific or indefinite appropriation made hereafter in any regular appropriation Act shall be construed to be permanent or available continuously without reference to a fiscal year unless it belongs to one of the following five classes: "Rivers and harbors," "lighthouses," "fortifications," "public buildings," and "pay of the Navy and Marine Corps,"

1874—Act of June 23, 1874 (18 Stat. L., 204, 217)—An Act Making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, eighteen hundred and seventy-five, and for other purposes.

* * * *

. . . *Provided,* That the Secretary of the Treasury shall have power to order the sale at auction, after due public notice, of any real estate or other property pertaining to the Light-House Establishment, no longer required for light-house purposes; the proceeds of such sales, after the payment therefrom of the expenses of making the same, to be deposited and covered into the Treasury as miscellaneous receipts, as now provided by law in like cases.[10]

1875—Act of March 3, 1875 (18 Stat. L., 371, 372)—An Act Making appropriations for sundry civil expenses for the fiscal year ending June thirtieth, eighteen hundred and seventy-six, and for other purposes.

* * * *

And the Secretary of the Treasury is hereby authorized, whenever he shall deem it advisable, to acquire, by donation or purchase in behalf of the United States, the right to use and occupy sites for . . . pier-head beacons, the establishment of which has been, or shall hereafter be, authorized by Congress.

1880—Act of June 16, 1880 (21 Stat. L., 259, 263)—An Act Making appropriations for the sundry civil expenses of the government for the fiscal year ending June thirtieth, eighteen hundred and eighty-one, and for other purposes.

* * * *

. . . *Provided,* That masters of light-house tenders shall have police powers in matters pertaining to government property and smuggling.

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last specifically named in and excepted from the operation of the provisions of the so-called "covering-in Act" approved June twentieth, eighteen hundred and seventy-four, or unless it is made in terms expressly providing that it shall continue available beyond the fiscal year for which the appropriation Act in which it is contained makes provision.

[10] Modified by the acts of February 14, 1903 (32 Stat. L., 829) and March 4, 1913 (37 Stat. L., 736).

The act of March 3, 1879 (20 Stat. L., 377, 383), provides "That authority be, and is hereby, given to the Secretary of the Treasury to lease, at his discretion for a period not exceeding five years, such unoccupied and unproductive property of the United States under his control, for the leasing of which there is no authority under existing law, and such leases shall be reported annually to Congress." This applies to all property transferred to the Commerce Department by the acts of February 14, 1903, and March 4, 1913.

1882—Act of August 7, 1882 (22 Stat. L., 302, 309)—An Act Making appropriations for sundry civil expenses of the government for the fiscal year ending June thirtieth, eighteen hundred and eighty-three, and for other purposes.

* * * *

That all parties owning, occupying, or operating bridges over any navigable river shall maintain at their own expense, from sunset to sunrise, throughout the year, such lights on their bridges as may be required by the Light-House Board for the security of navigation: and in addition thereto all persons owning, occupying, or operating any bridge over any navigable river shall, in any event, maintain all lights on their bridge that may be necessary for the security of navigation.[11]

1884—Act of July 7, 1884 (23 Stat. L., 194, 198)—An Act Making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, eighteen hundred and eighty-five, and for other purposes.

* * * *

That hereafter it shall be the duty of the Light-House Board to apply the money appropriated, other than for surveys, as far as can be without detriment to the interests of the Government, by contract.[12]

1886—Act of July 26, 1886 (24 Stat. L., 148)—An Act Authorizing the construction of additional light-house districts.

That section forty-six hundred and seventy of the Revised Statutes is hereby amended so as to read as follows:

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[11] Modified by the act of June 17, 1910 (36 Stat. L., 534).

The act of March 23, 1906 (34 Stat. L., 84, 85), provides that the person owning or operating any such bridge shall maintain, at their own expense, such lights and other signals thereon as the Secretary of Commerce shall prescribe.

The act of June 23, 1910 (36 Stat. L., 593, 594)—An Act To amend an Act entitled "An Act to regulate the construction of dams across navigable waters," approved June twenty-first, nineteen hundred and six, provides "Sec. 3. That the persons constructing, maintaining, or operating any dam or appurtenant or accessory works, in accordance with the provisions of this Act, shall be liable for any damage that may be inflicted thereby upon private property, either by overflow or otherwise. The persons owning or operating any such dam, or accessory works, subject to the provisions of this Act, shall maintain, at their own expense, such lights and other signals . . . as the Secretary of Commerce . . . shall prescribe, and for failure so to do in any respect shall be deemed guilty of a misdemeanor and subject to a fine of not less than five hundred dollars, and each month of such failure shall constitute a separate offense and subject such persons to additional penalties therefor.

[12] Modified by the act of June 17, 1910 (34 Stat. L., 534).

"The Light-House Board shall arrange the ocean, gulf, lake, and river coasts of the United States into light-house districts, not exceeding sixteen in number.

That any law or regulation prohibiting the employment in the light-houses of the United States of persons of more than forty-five years of age be and the same is hereby repealed."

1895—Act of June 12, 1895 (28 Stat. L., 601, 623)—An Act Providing for the public printing and binding and the distribution of public documents.

* * * *

SEC. 89. . . . That the Secretary of the Treasury may authorize the printing of the notices to mariners . . . and other special publications . . . of the Light-House Board . . . in such editions as the interests of the Government and the interests of the public may require.[13]

1902—Act of June 28, 1902 (32 Stat. L., 419, 433)—An Act Making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, nineteen hundred and three, and for other purposes.

* * * *

Hereafter there shall be submitted in the annual Book of Estimates, under each item of appropriation under the head of "Light-House Establishment," notes showing the number of persons employed and the rate of compensation paid to each from each of said appropriations during the fiscal year next preceding the fiscal year for which estimates are submitted.[14]

1903—Act of February 14, 1903 (32 Stat. L., 825, 826)—An Act To establish the Department of Commerce and Labor.

* * * *

SEC. 3. That it shall be the province of the said Department [of Commerce and Labor] to foster, promote, and develop the foreign and domestic commerce, the mining, manufacturing, shipping, and fishery industries, the labor interests, and the transportation facilities of the United States; and to this end it shall be vested with jurisdiction and control of the departments, bureaus, offices, and branches of the public service hereinafter specified, and with such other powers and duties as may be prescribed by law. . . .

SEC. 4. That the following-named offices, bureaus, divisions, and branches of the public service, now and heretofore under the jurisdiction of the Department of the Treasury, and all that pertains to the same, known as the Light-House Board, the Light-House Establishment . . . be and the same hereby are, transferred from the Department of the Treasury to the Department of Commerce and Labor, and the same shall hereafter remain under the jurisdiction and supervision of the last-named Department; . . .

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[13] Modified by the act of February 14, 1903 (32 Stat. L., 829), June 17, 1910 (36 Stat. L., 534), and March 4, 1913 (37 Stat. L., 736).

[14] Modified by the Budget and Accounting Act of June 10, 1921 (42 Stat. L., 20)

1906—Act of June 20, 1906 (34 Stat. L., 321, 324)—An Act To authorize additional aids to navigation in the Light-House Establishment.

* * * *

SEC. 3. That after the first day of January, nineteen hundred and seven, it shall be unlawful for any person, company, corporation, or municipality not under the control of the Light-House Board, to establish, erect, or maintain in the navigable waters of the United States any lights as an aid to navigation, or any other aid to navigation similar to any of those maintained by the United States under the control and direction of the Light-House Board, without first obtaining permission so to do from the Light-House Board, in accordance with rules and regulations to be established by the Secretary of Commerce and Labor; and any person violating the provisions of this section or any of the rules and regulations established by the Secretary of Commerce and Labor in accordance herewith shall be deemed guilty of a misdemeanor and be subject to a fine not exceeding the sum of one hundred dollars for each offense, and each day during which such violation shall continue shall be considered as a new offense.[15]

1907—Act of February 26, 1907 (34 Stat. L., 995, 997)—An Act To authorize additional aids to navigation in the Light-House Establishment, and for other purposes.

* * * *

SEC. 6. That hereafter officers of the Army and Navy detailed for service in connection with the Light-House Establishment shall be paid their actual traveling expenses when traveling under orders on official duty to and from points which can not be conveniently reached by vessel or railroad.

1908—Act of May 14, 1908 (35 Stat. L., 160, 162)—An Act To authorize additional aids to navigation in the Light-House Establishment, and for other purposes.[16]

* * * *

SEC. 4. That it is hereby made the duty of the Light-House Board to care for and maintain the anchorage buoys in New York Harbor and Philadelphia Harbor heretofore placed there by the United States.

SEC. 5. That any person, firm, company, or corporation required by law to maintain a light or lights upon any bridge or abutments over or in any navigable waters, who shall fail or refuse to maintain such light or lights, or to obey any of the lawful rules and regulations relating to the same, shall be deemed guilty of a misdemeanor and be subject to a fine not ex-

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[15] Modified by acts of June 17, 1910 (36 Stat. L., 534), and March 4, 1913 (37 Stat. L., 736).

Sec. 297 of the act of March 4, 1909 (35 Stat. L., 1088, 1146), provides that whoever holds out or shows any false light, or extinguishes any true light, with intent to bring any vessel sailing upon the sea into danger, or distress, or shipwreck, shall be imprisoned not less than ten years and may be imprisoned for life.

[16] Modified by acts of June 17, 1910 (36 Stat. L., 534), and March 4, 1913 (37 Stat. L., 736).

ceeding the sum of one hundred dollars for each offense, and each day during which such violation shall continue shall be considered as a new offense.

SEC. 6. That it shall be unlawful for any person to obstruct or interfere with any aid to navigation established or maintained in the Light-House Establishment under the Light-House Board, or to anchor any vessel in any of the navigable waters of the United States so as to obstruct or interfere with range lights maintained therein, and any person violating the provisions of this section shall be deemed guilty of a misdemeanor and be subject to a fine not exceeding the sum of five hundred dollars for each offense, and each day during which such violation shall continue shall be considered as a new offence.[17]

SEC. 7. That the Secretary of Commerce and Labor shall annually cause the Light-House Board to make a report to him for transmission to Congress of all aids to navigation in service which may be discontinued without distinct injury to the interests of navigation.

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[17] The act of August 14, 1876 (19 Stat. L., 132, 139), provides that Any person who shall wilfully and unlawfully injure any pier, break-water, or other work of the United States for the improvement of rivers or harbors, or navigation in the United States, shall, on conviction thereof, be punished by a fine not exceeding one thousand dollars.

The act of March 3, 1899 (30 Stat. L., 1120, 1152), provides

SEC. 14. That it shall not be lawful for any person or persons to take possession of or make use of for any purpose, or build upon, alter, deface, destroy, move, injure, obstruct by fastening vessels thereto or otherwise, or in any manner whatever impair the usefulness of any sea wall, bulk-head, jetty, dike, levee, wharf, pier, or other work built by the United States, or any piece of plant, floating or otherwise, used in the construction of such work under the control of the United States, in whole or in part, for the preservation and improvement of any of its navigable waters or to prevent floods, or as boundary marks, tide gauges, surveying stations, buoys, or other established marks, nor remove for ballast or other purposes any stone or other material composing such works: *Provided,* That the Secretary of War may, on the recommendation of the Chief of Engineers, grant permission for the temporary occupation or use of any of the aforementioned public works when in his judgment such occupation or use will not be injurious to the public interest.

. . . And whenever a vessel, raft, or other craft is wrecked and sunk in a navigable channel, accidentally or otherwise, it shall be the duty of the owner of such sunken craft to immediately mark it with a buoy or beacon during the day and a lighted lantern at night, and to maintain such marks until the sunken craft is removed or abandoned, and the neglect or failure of the said owner so to do shall be unlawful; . . .

SEC. 16. That every person and every corporation that shall violate, or that shall knowingly aid, abet, authorize or instigate a violation of the provisions of sections . . . fourteen, and fifteen of this Act shall be guilty of a misdemeanor, and on conviction thereof shall be punished by a fine not exceeding twenty-five hundred dollars nor less than five hundred dollars, or by imprisonment (in case of a natural person) for not less than thirty days nor more than one year, or by both such fine and imprisonment, in the discretion of the court, one-half of said fine to be paid to the person or persons giving information which shall lead to conviction. . . .

1909—Act of March 4, 1909 (35 Stat. L., 945, 972)—An Act Making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, nineteen hundred and ten, and for other purposes.[18]

* * * *

. . . the Light-House Board being hereby authorized to lease the necessary ground for all such lights and beacons as are for temporary use or are used to point out changeable channels, and which in consequence can not be made permanent, . . .

* * * *

. . . *Provided,* That hereafter any and all proposals for bids for any new machinery or other new equipment necessary in the repair of any vessel in the Light-House Service shall be on specifications prepared and submitted that will secure competition in the bids for furnishing such machinery or equipment.

1910—Act of June 17, 1910 (36 Stat. L., 534, 537)—An Act To authorize additional aids to navigation in the Light-House Establishment, and to provide for a Bureau of Light-Houses in the Department of Commerce and Labor, and for other purposes.[19]

* * * *

SEC. 4. That hereafter there shall be in the Department of Commerce and Labor a bureau of light-houses and a commissioner of light-houses, who shall be the head of said bureau, to be appointed by the President, who shall receive a salary of five thousand dollars per annum. There shall also be in the bureau a deputy commissioner, to be appointed by the President, who shall receive a salary of four thousand dollars per annum, and a chief clerk, who shall perform the duties of chief clerk and such other duties as may be assigned to him by the Secretary of Commerce and Labor or by the commissioner. There shall also be in the bureau such inspectors, clerical assistants, and other employees as may from time to time be authorized by Congress, and there shall also be employed one chief constructing engineer at a salary of four thousand dollars per annum and one superintendent of naval construction at a salary of three thousand dollars per annum, both to be appointed by the President. The commissioner of light-houses shall make an annual report to the Secretary of Commerce and Labor, who shall transmit the same to Congress at the beginning of each regular session thereof; and such commissioner, subject to the approval of the Secretary of Commerce and Labor, is hereby authorized to consider, ascertain, adjust, and determine all claims for damages, where the amount of the claim does not exceed the sum of five hundred dollars, hereafter occasioned by collisions, for which collisions vessels of the Light-House Service shall be found responsible, and report the amounts so ascertained and determined to be due the claimants to Congress at each session therof

[18] Modified by the act of June 17, 1910 (36 Stat. L., 534).

[19] Modified by the act of March 4, 1913 (37 Stat. L., 736), and the Classification Act of 1923 (42 Stat. L., 1488).

through the Treasury Department for payment as legal claims out of appropriations that may be made by Congress therefor.

SEC. 5. That all employees of or in the Light-House Board or the Light-House Establishment are hereby transferred to the bureau of light-houses, excepting, however, army and navy officers.

SEC. 6. That all duties performed and all power and authority now possessed or exercised by the Light-House Board, under any provision of law not hereby repealed, are hereby transferred to and imposed and conferred upon and vested in the commissioner of light-houses, under the direction and control of the Secretary of Commerce and Labor.

SEC. 7. That the commissioner of light-houses shall, under the direction and control of the Secretary of Commerce and Labor, have charge and control of the construction, maintenance, repair, illumination, inspection, and superintendence of light-house depots, supply stations, light and signal stations, light-houses, light-vessels, light-house tenders, fog signals, submarine signals, beacons, buoys, day marks, post-lantern lights, and seamarks and their appendages, and generally of the Light-House Service; and the charge and custody of all the archives, books, documents, drawings, models, returns, apparatus, and other things appertaining to the Light-House Establishment.

SEC. 8. That all materials for construction, maintenance, repair, and operation shall be procured by public contracts, under such regulations as may from time to time be prescribed by the commissioner, subject to the approval of the Secretary of Commerce and Labor, and no contract shall be made except after public advertisement for proposals in such form and manner as to secure general notice thereof, and the same shall only be made with the lowest and best bidder therefor, upon security deemed sufficient in the judgment of the commissioner of light-houses, but all bids may at any time be rejected by the commissioner: *Provided, however,* That the commissioner of light-houses may purchase illuminating oil, wicks, and chimneys for lights, and ground tackle for light-vessels and buoys, and to an amount not exceeding five hundred dollars at any one time, other materials and supplies when immediate delivery is required by an exigency, by private contract or in the open market, if he deems it for the best interests of the service so to do; but such purchases shall be set forth in the annual report of the commissioner with the reasons for purchasing other than upon bids after public advertisement.

SEC. 9. That the commissioner, under the direction of the Secretary of Commerce and Labor, is authorized, whenever an appropriation is made by Congress for a new light-house, the proper site for which does not belong to the United States, to purchase the necessary land for such site, provided the purchase money be paid from the amount appropriated for such light-house without exceeding the limit of cost, if any, fixed in such case; and the commissioner of light-houses is authorized to employ temporarily draftsmen for the preparation of plans for tenders and light-vessels which may be authorized by Congress, to be paid from the respective appropriations therefor.

SEC. 10. That the commissioner of light-houses, under the direction and control of the Secretary of Commerce and Labor, shall, from time to time, prescribe and distribute such regulations as he may deem proper for securing an efficient, uniform, and economic administration of the Light-House Service.

SEC. 11. That the commissioner of light-houses, subject to the approval of the Secretary of Commerce and Labor, as soon as practicable, shall rearrange the ocean, gulf, and lake coasts and the rivers of the United States, Porto Rico, and the naval station in Cuba into not exceeding nineteen light-house districts, and a light-house inspector shall be assigned in charge of each district. The light-house inspectors shall each receive a salary of two thousand four hundred dollars per annum, except the inspector of the third district, whose salary shall be three thousand six hundred dollars per annum. The President may, for a period not exceeding three years from the taking effect of this section, assign army and navy officers to act in lieu of the appointment of civilian light-house inspectors, but such army and navy officers shall not receive any salary or compensation in addition to the salary or compensation they are entitled to as such army or navy officers: *Provided,* That in the districts which include the Mississippi River and its tributaries the President may designate army engineers to perform the duties of and act as inspectors. The President may detail officers of the Engineer Corps of the United States Army for consultation or to superintend the construction or repair of any aid to navigation authorized by Congress.

SEC. 12. That all unexpended appropriations which shall be available at the time when this Act takes effect, in relation to the Light-House Board, the Light-House Establishment, and the Light-House Service, shall be available from the time that this Act takes effect for expenditures in and by the bureau of light-houses, and shall be treated the same as though the bureau of light-houses had been named directly in the Acts making said appropriations.

SEC. 13. That sections forty-six hundred and fifty-three, forty-six hundred and fifty-four, forty-six hundred and fifty-five, forty-six hundred and fifty-six, forty-six hundred and fifty-seven, forty-six hundred and fifty-eight, forty-six hundred and fifty-nine, forty-six hundred and sixty, forty-six hundred and sixty-three, forty-six hundred and sixty-four, forty-six hundred and sixty-five, forty-six hundred and sixty-six, forty-six hundred and sixty-seven, forty-six hundred and sixty-nine, forty-six hundred and seventy, and forty-six hundred and seventy-one of the Revised Statutes of the United States are hereby repealed.

SEC. 14. That sections four to thirteen, inclusive, of this Act, shall take effect on the first day of July next succeeding its passage.

1910—Act of June 25, 1910 (36 Stat. L., 703, 755)—An Act Making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, nineteen hundred and eleven, and for other purposes.

* * * *

Hereafter there shall be submitted, following each estimate for support of the Light-House Establishment, statements showing the amount required for each object of expenditure mentioned in each of said estimates, together with a statement of the expenditures under each of such objects for the fiscal year terminated next preceding the period of submitting said estimates.[20]

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[20] Modified by the Budget and Accounting Act of June 10, 1921 (42 Stat. L., 20).

1912—Act of July 27, 1912 (37 Stat. L., 238, 239)—An Act To authorize additional aids to navigation in the Lighthouse Service, and for other purposes.

* * * *

[SECTION 1.] . . . Post-lantern lights may be established and maintained, in the discretion of the Commissioner of Lighthouses, out of the annual appropriations for the Lighthouse Service, on the Saint Croix River, including Lake Saint Croix, Wisconsin and Minnesota.

SEC. 2. That hereafter, in case of the absence of the Commissioner and Deputy Commissioner of the Bureau of Lighthouses, the Secretary of Commerce and Labor [21] may designate some officer of said bureau to perform the duties of the commissioner during his absence.

And hereafter the benefits of the Act of May thirtieth, nineteen hundred and eight (Thirty-fifth Statutes, page five hundred and fifty-six), entitled "An Act granting to certain employees of the United States the right to receive from it compensation for injuries sustained in the course of their employment," shall be extended to persons employed by the United States in any hazardous employment in the Lighthouse Service; and hereafter the Secretary of Commerce and Labor is authorized to purchase, from the appropriations for the Lighthouse Service, clothing for the crews of vessels, to be sold to the employees of said service and the appropriations reimbursed; and hereafter reimbursement, under rules prescribed by the Secretary of Commerce and Labor, is authorized to keepers of light stations and masters of light vessels and of lighthouse tenders for rations and provisions and clothing furnished shipwrecked persons who may be temporarily provided for by them, not exceeding in all five thousand dollars in any fiscal year.

1913—Act of March 4, 1913 (37 Stat. L., 736)—An Act To create a Department of Labor.

[SECTION 1.] . . . That . . . the Department of Commerce and Labor shall hereafter be called the Department of Commerce, . . . and the Act creating the said Department of Commerce and Labor is hereby amended accordingly.

1913—Act of March 4, 1913 (37 Stat. L., 1017, 1018)—An Act To authorize aids to navigation and other works in the Lighthouse Service, and for other purposes.

* * * *

Hereafter the purchase of necessary additional land for light stations and depots is authorized under rules prescribed by the Secretary of Commerce and Labor: [21] *Provided,* That no single acquisition of such additional land shall cost in excess of $500.

Hereafter supplies and equipment for special works of the Lighthouse Service may be furnished from general stock and the appropriations "General expenses, Lighthouse Service," reimbursed therefor from the respective appropriations for special works.

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[21] See Act of March 4, 1913 (37 Stat. L., 736).

Hereafter when any condemned supplies, materials, equipment or land can not be profitably used in the work of the Lighthouse Service the same shall be appraised and sold, either by sealed proposals for the purchase of the same or by public auction after advertisement of the sale for such time as in the judgment of the Secretary of Commerce and Labor the public interests require, the proceeds of such sales, after the payment therefrom of the expenses of making the sales, to be deposited and covered into the Treasury as miscellaneous receipts as now provided for by law in like cases.

1914—Act of August 1, 1914 (38 Stat. L., 609, 658)—An Act Making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, nineteen hundred and fifteen, and for other purposes.

* * * *

Hereafter employees of the Lighthouse Service, who are not now entitled to leave of absence with pay and who have served twelve consecutive months, shall be given fifteen days' leave of absence with pay each year: *Provided,* That pro rata leave shall be allowed those serving fractional parts of a year: *Provided further,* That heads of divisions shall have discretion as to the time when the leave shall be granted.

1915—Act of March 3, 1915 (38 Stat. L., 925, 927)—An Act To authorize aids to navigation and other works in the Lighthouse Service, and for other purposes.

* * * *

SEC. 4. That hereafter employees of the Lighthouse Service compensated at a per diem rate of pay may be granted fifteen working days' leave of absence each year without forfeiture of pay during such absence, under rules prescribed by the Secretary of Commerce: *Provided,* That no employee of the class herein mentioned shall be entitled to any leave until he has served twelve consecutive months, when he may be granted fifteen days' leave, and that during the second or any subsequent year fifteen days' leave at the rate of one and one-fourth days per month, as earned, may be granted from the beginning of the second service year: *Provided further,* That the inspectors of the several lighthouse districts shall have discretion as to the time when the leave can be allowed without detriment to the service, and that absence on account of sickness shall be deducted from the leave hereby granted.

SEC. 5. That hereafter post-lantern lights and other aids to navigation may be established and maintained, in the discretion of the Commissioner of Lighthouses, out of the annual appropriations for the Lighthouse Service, on Lakes Okechobee and Hicpochee and connecting waterways across the State of Florida and on the Apalachicola River and Chipola cutoff.

SEC. 6. That hereafter the annual appropriations for the Lighthouse Service shall be available for defraying the expenses of coöperation between the Lighthouse Service and the Forest Service in the management of forest land on lighthouse reservations.

SEC. 7. That hereafter the provisions of section eight of the Act of Congress approved August twenty-fourth, nineteen hundred and twelve (Thirty-seventh Statutes, page four hundred and eighty-seven), relative to the administering of oaths to travel accounts or other expenses against the United States shall be extended to chief clerks in the offices of lighthouse inspectors or other employees in the Lighthouse Service designated by them, and hereafter chief clerks in offices of lighthouse inspectors and employees designated by them are authorized to administer oaths of office to employees of the Lighthouse Service.

SEC. 8. That hereafter the penalties provided in section six of the Act of May fourteenth, nineteen hundred and eight (Thirty-fifth Statutes, page one hundred and sixty-two), for obstruction to or interference with any aid to navigation maintained by the Lighthouse Service shall apply with equal force and effect to any private aid to navigation lawfully maintained under the authority granted the Secretary of Commerce and the Commissioner of Lighthouses by section six of the Act of June twentieth, nineteen hundred and six (Thirty-fourth Statutes, page three hundred and twenty-four).

1916—Act of August 28, 1916 (39 Stat. L., 536, 538)—An Act To authorize aids to navigation and for other works in the Lighthouse Service, and for other purposes.

* * * *

SEC. 2. That hereafter the Secretary of Commerce is authorized, whenever he shall deem it advisable, to exchange any right of way of the United States in connection with lands pertaining to the Lighthouse Service for such other right of way as may be advantageous to the service, under such terms and conditions as he may deem to be for the best interests of the Government; and in case any expenses, not exceeding the sum of $500, are incurred by the United States in making such exchange, the same shall be payable from the appropriation "General Expenses, Lighthouse Service," for the fiscal year during which such exchanges shall be effected.

SEC. 3. That hereafter post lantern lights and other aids to navigation may be established and maintained, in the discretion of the Commissioner of Lighthouses, out of the annual appropriation for the Lighthouse Service on the Mobile, Tombigbee, Warrior, and Black Warrior Rivers, Alabama, and Lake Tahoe, California and Nevada.

* * * *

SEC. 5. That hereafter light keepers and assistant light keepers of the Lighthouse Service shall be entitled to medical relief without charge at hospitals and other stations of the Public Health Service under the rules and regulations governing the care of seamen of the merchant marine; *Provided,* That this benefit shall not apply to any keeper or assistant keeper who receives an original appointment after the passage of this Act, unless the applicant passes a physical examination in accordance with rules approved by the Secretary of Commerce and the Secretary of the Treasury.

1916—Act of August 29, 1916 (39 Stat. L., 556, 602)—An Act Making appropriations for the naval service for the fiscal year ending June thirtieth, nineteen hundred and seventeen, and for other purposes.

* * * *

The President is hereby authorized, whenever in his judgment a sufficient national emergency exists, to transfer to the service and jurisdiction of the Navy Department, or of the War Department, such vessels, equipment, stations, and personnel of the Lighthouse Service as he may deem to the best interest of the country, and after such transfer all expenses connected therewith shall be defrayed out of the appropriations for the department to which transfer is made: *Provided,* That such vessels, equipment, stations, and personnel shall be returned to the Lighthouse Service when such national emergency ceases in the opinion of the President, and nothing in this Act shall be construed as transferring the Lighthouse Service or any of its functions from the Department of Commerce except in time of national emergency and to the extent herein provided: *Provided further,* That any of the personnel of the Lighthouse Service who may be transferred as herein provided shall, while under the jurisdiction of the Navy Department or War Department, be subject to the laws, regulations, and orders for the government of the Navy or Army, as the case may be, in so far as the same may be applicable to persons whose retention permanently in the military service of the United States is not contemplated by law.

The Secretary of the Navy, the Secretary of War, and the Secretary of Commerce shall jointly prescribe regulations governing the duties to be performed by the Lighthouse Service in time of war, and for the coöperation of that service with the Navy and War Departments in time of peace in preparation for its duties in war, and this may include arrangements for a direct line of communication between the officers or bureaus of the Navy and War Departments and the Bureau of Lighthouses to provide for immediate action on all communications from these departments.

1917—Act of October 6, 1917 (40 Stat. L., 393)—An Act To provide for the service of officers of auxiliary naval forces on naval courts.

That when actively serving under the Navy Department in time of war or during the existence of an emergency, pursuant to law, as a part of the naval forces of the United States, commissioned officers of the Naval Reserve Force, Marine Corps Reserve, National Naval Volunteers, Naval Militia, Coast Guard, Lighthouse Service, Coast and Goedetic Survey, and Public Health Service are hereby empowered to serve on naval courts-martial and deck courts under such regulations necessary for the proper administration of justice and in the interests of the services involved, as may be prescribed by the Secretary of the Navy: . . .

1918—Act of June 20, 1918 (40 Stat. L., 607, 608)—An Act To authorize aids to navigation and for other works in the Lighthouse Service, and for other purposes.

* * * *

SEC. 2. That hereafter the appropriation, "General expenses, Lighthouse Service," shall be available, under regulations prescribed by the Secretary of Commerce, for the payment of traveling and subsistence expenses of teachers while actually employed by States or private persons to instruct the children of keepers of lighthouses.

* * * *

SEC. 4. That hereafter the Secretary of Commerce is authorized to provide, under regulations to be prescribed by him, for the sale of publications of the Bureau of Lighthouses and the Lighthouse Service, including the allowance of a commission for such sales.

SEC. 5. That hereafter post lantern lights and other aids to navigation may be established and maintained, in the discretion of the Commissioner of Lighthouses, out of the annual appropriations for the Lighthouse Service, on Lakes Union and Washington, in the State of Washington.

SEC. 6. That hereafter all officers and employees engaged in the field service or on vessels of the Lighthouse Service, except persons continuously employed in district offices or shops, who shall have reached the age of sixty-five years, after having been thirty years in the active service of the Government, may at their option be retired from further performance of duty; and all such officers and employees who shall have reached the age of seventy years shall be compulsorily retired from further performance of duty: *Provided,* That the annual compensation of persons so retired shall be a sum equal to one-fortieth of the average annual pay received for the last five years of service for each year of active service in the Lighthouse Service or in a department or branch of the Government having a retirement system, not to exceed in any case thirty-fortieths of such average annual pay received: *Provided further,* That such retirement pay shall not include any amount on account of subsistence or other allowance.

SEC. 7. That hereafter a superintendent of lighthouses shall be assigned in charge of each lighthouse district at an annual salary of not exceeding $3,000 each, except that the salary of the third lighthouse district shall remain at $3,600, as now fixed by law: *Provided,* That officers now designated as lighthouse inspectors shall be transferred to the positions of superintendent of lighthouses herein authorized in lieu of lighthouse inspectors: *Provided further,* That in the districts which include the Mississippi River and its tributaries the President may designate Army engineers to perform the duties of and act as superintendent of lighthouses without additional compensation.[22]

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[22] The salary provisions of this section were invalidated by the Classification Act of 1923 (42 Stat. L., 1488).

1919—Act of March 3, 1919 (40 Stat. L., 1302)—An Act To authorize the Secretary of the Treasury to provide hospital and sanatorium facilities for discharged sick and disabled soldiers, sailors, and marines.

[SECTION 1]. That the Secretary of the Treasury be, and he is hereby authorized to provide immediate additional hospital and sanatorium facilities for the care and treatment of discharged sick and disabled soldiers, sailors, and marines, Army and Navy nurses (male and female), patients of the War Risk Insurance Bureau, and the following persons only: Merchant marine seamen, seamen on boats of the Mississippi River Commission, officers and enlisted men of the United States Coast Guard, officers and employees of the Public Health Service, certain keepers and assistant keepers of the United States Lighthouse Service, seamen of the Engineer Corps of the United States Army, officers and enlisted men of the United States Coast and Geodetic Survey, civilian employees entitled to treatment under the United States Employees' Compensation Act, and employees on Army transports not officers or enlisted men of the Army, now entitled by law to treatment by the Public Health Service.

1920—Act of May 22, 1920 (41 Stat. L., 614)—An Act For the retirement of employees in the classified civil service, and for other purposes.

* * * *

. . . such employees of the Lighthouse Service as come within the provisions of section 6 of the Act of June 20, 1918, entitled "An Act to authorize aids to navigation and for other works in the Lighthouse Service, and for other purposes" (40 Stat. L., 607), shall not be included in the provisions of this Act.

1921—Act of March 4, 1921 (41 Stat. L., 1367, 1417)—An Act Making appropriations for sundry civil expenses of the Government for the fiscal year ending June 30, 1922, and for other purposes.

* * * *

The provision of section 6 of the Act entitled "An Act to authorize aids to navigation and for other works in the Lighthouse Service, and for other purposes," approved June 20, 1918, relative to compulsory retirement shall not apply to an employee of the Lighthouse Service if within sixty days after the passage of this Act or not less than thirty days before the arrival of such employee at the age of seventy, the Secretary of Commerce shall certify as a matter of public record that by reason of his efficiency and willingness to remain in the Lighthouse Service of the United States the continuance of such employee therein would be advantageous to the public service. In that event such employee may be retained for a term not exceeding two years, and at the end of two years such employee may,

by similar certification, be continued for an additional term not exceeding two years: *Provided, however,* That at the end of ten years after this Act becomes effective no employee shall be continued in the Lighthouse Service beyond the age of compulsory retirement defined in the Act of June 20, 1918, referred to in this paragraph: *Provided further,* That nothing herein shall exclude or prevent any employee of the Lighthouse Service who shall have reached the age of compulsory retirement within thirty days before or after the date of the passage of this Act from enjoying the privileges thereof.

1922—Act of September 15, 1922 (42 Stat. L., 844)—An Act To provide for the marking of anchorage grounds in waters of the United States.

That hereafter the Commissioner of Lighthouses shall provide, establish, and maintain, out of the annual appropriations for the Lighthouse Service, buoys, or other suitable marks for marking anchorage grounds for vessels in waters of the United States, when such anchorage grounds have been defined and established by proper authority in accordance with the laws of the United States.

1923—Act of March 2, 1923 (42 Stat. L., 1377)—An Act To authorize the sale of the Montreal River Lighthouse Reservation, Michigan, to the Gogebic County Board of the American Legion, Bessemer, Michigan.

1924—Act of June 7, 1924 (43 Stat. L., 635)—An Act Authorizing transfer of certain abandoned or unused lighthouse reservation lands by the United States to the State of New York for park purposes.

1925—Act of February 27, 1925 (43 Stat. L., 1014, 1043)—An Act Making appropriations for the Departments of State and Justice and for the Judiciary, and for the Departments of Commerce and Labor, for the fiscal year ending June 30, 1926, and for other purposes.

* * * *

BUREAU OF LIGHTHOUSES

Salaries: For the commissioner and other personal services in the District of Columbia in accordance with the Classification Act of 1923, $89,880.

General expenses: For supplies, repairs, maintenance, and incidental expenses of lighthouses and other lights, beacons, buoyage, fog signals, lighting of rivers heretofore authorized to be lighted, light vessels, other aids to navigation, and lighthouse tenders, including the establishment, repair, and improvement of beacons and day marks, and purchase of land for same; establishment of post lights, buoys, submarine signals, and fog signals; establishment of oil or carbide houses, not to exceed $10,000; *Provided,* That any oil or carbide house erected hereunder shall not exceed $1,000 in

cost; construction of necessary outbuildings at a cost not exceeding $500 at any one light station in any fiscal year; improvement of grounds and buildings connected with light stations and depots; restoring light stations and depots and buildings connected therewith; *Provided further,* That such restoration shall be limited to the original purpose of the structures; wages of persons attending post lights; temporary employees and field force while engaged on works of general repair and maintenance, and laborers and mechanics at lighthouse depots; rations and provisions or commutation thereof for working parties in the field, officers and crews of light vessels and tenders, and officials and other authorized persons of the Lighthouse Service on duty on board of such tenders or vessels, and money accruing from commutation for rations and provisions for the above-named persons on board of tenders and light vessels or in working parties in the field may be paid on proper vouchers to the person having charge of the mess of such vessel or party; purchase of rubber boots, oilskins, rubber gloves, and coats, caps, and aprons for stewards' departments on vessels; reimbursement under rules prescribed by the Secretary of Commerce of keepers of light stations and masters of light vessels and of lighthouse tenders for rations and provisions and clothing furnished shipwrecked persons who may be temporarily provided for by them, not exceeding in all $5,000 in any fiscal year; fuel and rent of quarters where necessary for keepers of lighthouses; purchase of land sites for fog signals; rent of necessary ground for all such lights and beacons as are for temporary use or to mark changeable channels and which in consequence can not be made permanent; rent of offices, depots, and wharves; traveling expenses; mileage; library books for light stations and vessels, and technical books and periodicals not exceeding $1,000; traveling and subsistence expenses of teachers while actually employed by States or private persons to instruct the children of keepers of lighthouses; all other contingent expenses of district offices and depots, and not exceeding $8,500 for contingent expenses of the office of the Bureau of Lighthouses in the District of Columbia, $4,039,500.

Keepers of lighthouses: For salaries of not exceeding one thousand eight hundred lighthouse and fog-signal keepers and persons attending light exclusive of post lights, $1,970,000; *Provided,* That section 9 of the Act approved May 14, 1908 (Thirty-fifth Statutes, page 163), and section 3 of the Act approved June 20, 1918 (Fortieth Statutes, page 608), are hereby repealed.

Lighthouse vessels: For salaries and wages of officers and crews of light vessels and lighthouse tenders, including temporary employment when necesary, $2,220,000.

Superintendents, clerks, and so forth: For salaries of seventeen superintendents of lighthouses, and of assistant superintendents, clerks, draftsmen, and other authorized permanent employees in the district offices and depots of the Lighthouse Service, exclusive of those regularly employed in the office of the Bureau of Lighthouses, District of Columbia, $548,600.

Retired pay: For retired pay of officers and employees engaged in the field service or on vessels of the Lighthouse Service, except persons continuously employed in the district offices and shops, $110,000.

Public works: For constructing or purchasing and equipping lighthouse tenders and light vessels for the Lighthouse Service as may be specifically approved by the Secretary of Commerce not to exceed $485,000; and for establishing and improving aids to navigation and other works as may be specifically approved by the Secretary of Commerce, $240,000; in all, $725,000.

1925—Act of March 4, 1925 (43 Stat. L., 1261)—An Act To provide for retirement for disability in the Lighthouse Service.

[Section 1]. That hereafter any officer or employee to whom section 6 of the Act entitled "An Act to authorize aids to navigation and for other works in the Lighthouse Service, and for other purposes," approved June 20, 1918, as amended, applies, who has been in the active service of the Government fifteen years or more and who is found, after examination by a medical officer of the United States, to be disabled for useful and efficient service by reason of disease or injury not due to vicious habits, intemperance, or willful misconduct on his part, shall be retired under rules to be prescribed by the Secretary of Commerce on an annuity computed in the manner provided in such Act.

Sec. 2. Any such officer or employee may, upon recovery, be restored to active duty, and shall from time to time, before reaching the age at which he may be retired under such Act, be reëxamined by a medical officer of the United States upon the request of the Secretary of Commerce.

APPENDIX 6

FINANCIAL STATEMENTS

Explanatory Note

Statements showing appropriations, receipts, expenditures, and other financial data for a series of years constitute the most effective single means of exhibiting the growth and development of a service. Due to the fact that Congress has adopted no uniform plan of appropriations for the several services and that the latter employ no uniform plan in respect to the recording and reporting of their receipts and expenditures, it is impossible to present data of this character according to any standard scheme of presentation. In the case of some services the administrative reports contain tables showing financial conditions and operations of the service in considerable detail; in others financial data are almost wholly lacking. Careful study has in all cases been made of such data as are available, and the effort has been made to present the results in such a form as will exhibit the financial operations of the services in the most effective way that circumstances permit.

Beginning with the Annual Report of the Lighthouse Service for 1911, financial tables of appropriations and expenditures have been included, showing the amounts estimated, appropriated, and expended, the unexpended balances at the close of the fiscal year, the balances of special appropriations carried to the surplus fund, and itemized statements of maintenance appropriations. This report also contains concise summaries of all the work of the Service. Also, commencing with the fiscal year 1912, a cost-keeping system has been maintained in the Lighthouse Service showing in reasonable detail the cost of maintaining the principal units, or groups of units, of the Service, and classifying the purpose of all expenditures of funds provided for the Service, and a summary of this has been published in the Annual Report each year.

The first of the following tables aims to show approximately the cost of establishing and operating the aids to navigation from 1791 to the close of the fiscal year 1925. It is impossible to show the exact amount expended for this purpose, because prior to 1910 most of the higher officers of the service were detailed from the Army and Navy and their salaries can not be segregated. The figures from 1910 to date, more nearly show the true cost of the Lighthouse Service. The items for those years, however, do not include the salaries paid to the Army officers acting as Superintendents of the thirteenth, fourteenth, and fifteenth districts, who, however, devote only a part of their time to this work.

The figures in the first table are shown on the cash basis and give, therefore, annual cash outlays regardless of the year of appropriation. The figures for the years 1791 to 1882, inclusive, were taken from a "Statement of Appropriations and Expenditures for Public Buildings, Rivers and Harbors, Forts, Arsenals, Armories and other Public Works, March 4, 1789–June 30, 1882," published as Senate Document No. 196, 47th Congress, 1st Session. The figures for 1883 to 1890, inclusive, were taken from the "Account of the Receipts and Expenditures of the United States," prepared annually in the Office of the Register of the Treasury. The figures for 1891 to 1910, inclusive, are from the "Combined Statement of Receipts and Disbursements" issued annually by the Division of Bookkeeping and Warrants of the Treasury. The figures for 1911 to 1925, inclusive, are from the "Combined Statement of Receipts and Disbursements, Balances, etc., of the United States," issued annually by the Treasury.

The second table shows by appropriation items the total appropriation and expenditures by years from 1912 to 1925, inclusive, and the appropriation for 1926. The appropriations contain all important deficiency amounts. Expenditures for "maintenance" are figured on the accrual basis and represent, therefore, the total amount expended out of specific appropriations, regardless of whether the money was expended during the current fiscal year for which the appropriation was made or during the two succeeding years in which the funds were available. The expenditures under the heading "Special Works" are figured on the cash basis and show the annual cash outlay for the various items. Since most of

the appropriations for special works are "no years," *i. e.*, "continuing appropriations," figures showing the annual cash expenditures are the only significant ones. The items of appropriation and expenditure under "Special Works" were taken from the Annual Reports of the Bureau of Lighthouses. Those under "Maintenance" were obtained from the annual "Combined Statement of the Receipts, Disbursements, Balances, etc., of the United States," published by the Treasury Department.

The third table shows the costs of the various items of the Lighthouse Service. The costs are based on the actual expenditures, including direct purchases and articles issued from stock.

LIGHTHOUSE ESTABLISHMENT

Expenditures for Maintenance and Special Works by Years from 1791 to 1925

Year	Expenditures	Year	Expenditures	Year	Expenditures	Year	Expenditures
1791	$22,591.94	1825	$183.553.55	1859	$1,257,619.20	1893	$2,684,853.00
1792	38,976.36	1826	188,941.33	1860	994,093.83	1894	3,062,116.99
1793	12,061.68	1827	306,918.17	1861	894,302.63	1895	2,763,243.16
1794	37,496.36	1828	253,727.94	1862	661,370.52	1896	3,114,855.26
1795	29,861.30	1829	277,274.06	1863	873,230.52	1897	3,390,909.45
1796	35,207.48	1830	233,112.81	1864	948,159.51	1898	3,331,256.37
1797	48,174.47	1831	320,718.97	1865	1,215,917.07	1899	3,118,833.50
1798	52,906.18	1832	256,642.39	1866	1,370,396.06	1900	3,556,840.70
1799	69,509.15	1833	313,809.73	1867	2,176,632.36	1901	3,638,898.53
1800	40,633.68	1834	296,792.25	1868	2,590,101.62	1902	4,181,403.39
1801	81,429.95	1835	350,468.62	1869	1,910,674.12	1903	4,537,315.67
1802	68,928.85	1836	343,560.95	1870	2,582,203.78	1904	4,904,124.63
1803	75,787.95	1837	414,009.39	1871	2,675,322.63	1905	4,449,658.25
1804	93,775.82	1838	476,920.12	1872	3,166,672.44	1906	4,349,840.93
1805	122,029.74	1839	770,256.62	1873	2,910,961.64	1907	4,941,920.50
1806	88,993.38	1840	594,627.69	1874	2,493,182.06	1908	6,870,052.52
1807	86,582.63	1841	458,372.36	1875	2,925,353.77	1909	6,002,657.67
1808	90,051.98	1842	397,658.99	1876	2,703,280.12	1910	6,006,757.70
1809	83,140.74	1843	187,178.99	1877	2,367,220.70	1911	5,120,276.06
1810	94,037.74	1844	287,089.30	1878	2,193,893.33	1912	4,956,516.21
1811	114,970.79	1845	443,658.88	1879	2,343,638.64	1913	5,472,158.71
1812	126,603.12	1846	403,126.81	1880	2,426,370.61	1914	5,731,075.07
1813	128,144.38	1847	514,891.58	1881	2,642,668.99	1915	5,607,966.78
1814	78,961.46	1848	652,340.04	1882	2,392,147.12	1916	5,722,146.22
1815	48,816.78	1849	630,191.49	1883	2,224,432.30	1917	5,861,511.86
1816	108,369.52	1850	909,133.44	1884	2,330,549.57	1918	5,588,181.29
1817	122,187.29	1851	750,464.64	1885	2,284,868.97	1919	6,662,179.05
1818	162,067.51	1852	710,754.07	1886	2,073,358.91	1920	8,896,988.95
1819	115,350.79	1853	956,026.39	1887	2,143,719.22	1921	9,719,309.48
1820	163,656.34	1854	1,310,978.42	1888	2,566,733.51	1922	9,062,763.72
1821	149,440.22	1855	1,836,058.41	1889	2,702,442.72	1923	8,759,589.70
1822	144,991.38	1856	1,754,808.09	1890	2,905,337.88	1924	8,639,874.74
1823	207,913.23	1857	2,001,474.70	1891	3,007,883.33	1925	9,414,292.09
1824	153,419.96	1858	1,925,844.60	1892	3,237,317.44	Total	$279,120,062.20

LIGHTHOUSE SERVICE

Appropriations and Expenditures: Fiscal Years 1912 to 1926, Inclusive

Object	1912		1913		1914		1915		1916	
	Appropriation	Expenditure	Appropriation	Expenditure	Appropriation	Expenditure	Appropriation	Expenditure	Appropriation	Expenditure
Maintenance										
Salaries, Bureau of Light houses.	$64,630.00	$63,928.35	$64,630.00	$64,126.36	$64,510.00	$62,872.48	$64,050.00	$63,230.11	$64,030.00	$63,440.15
Salaries of keepers of light houses.	930,000.00	613,998.44	930,000.00	908,843.99	930,000.00	919,575.35	940,000.00	913,959.04	940,000.00	922,082.03
Salaries, Lighthouse Service	465,960.00	439,878.78	475,960.00	458,100.19	360,000.00	349,249.97	375,000.00	363,879.48	375,000.00	371,605.04
Salaries, lighthouse vessels..	1,007,420.00	937,065.55	957,420.00	929,180.18	967,420.00	958,285.88	997,600.00	991,249.52	1,010,000.00	1,080,939.49
General Expenses, Light house Service.	2,569,400.00	2,547,572.87	2,609,400.00	2,576,479.88	2,750,000.00	2,728,713.49	2,775,000.00	2,762,354.56	2,775,000.00	2,753,955.99
Additional Compensation ...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Retired Pay	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total Maintenance	$5,037,410.00	$4,602,443.99	$5,037,410.00	$4,936,730.60	$5,071,930.00	$5,018,697.18	$5,151,650.50	$5,094,672.71	$5,164,030.00	$5,192,022.70
Special Works										
New light and fog signal stations.	$810,950.00	.....	$146,500.00	.....	$432,500.00	.....	$63,000.00	.....	.....	.....
Lightships	75,000.00	.....	380,000.00	.....	125,000.00	.....	.....	.....	.....	.....
Lighthouse tenders	7,000.00	.....	.....	.....	.....	.....	.....	.....	$250,000.00	.....
Keepers' dwellings	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Improvement of aids.....	.....	.....	.....	.....	22,600.00	.....	50,000.00	.....	.....	.....
Lighthouse depots	100,000.00	.....	.....	.....	125,000.00	.....	23,000.00	.....	.....	.....
Radio fog signals.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total Special Works.....	$992,950.00	$310,884.98	$526,500.00	$461,627.02	$705,100.00	$538,338.00	$136,000.00	$500,516.00	$250,000.00	$748,883.50
Grand Total	$6,030,360.00	$4,913,328.97	$5,563,910.00	$5,398,357.62	$5,777,030.00	$5,557,035.18	$5,287,650.00	$5,595,188.71	$5,414,030.00	$5,940,906.20

APPROPRIATIONS AND EXPENDITURES: FISCAL YEARS 1912 TO 1926, INCLUSIVE—*Continued*

Object	1917		1918		1919		1920		1921	
	Appropriation	Expenditure	Appropriation	Expenditure	Appropriation	Expenditure	Appropriation	Expenditure	Appropriation	Expenditure
Maintenance										
Salaries, Bureau of Lighthouses.	$64,030.00	$61,410.37	$65,230.00	$59,832.02	$65,430.00	$58,786.87	$65,430.00	$58,579.58	$68,290.00	$63,963.76
Salaries, keepers of lighthouses.	940,000.00	931,953.98	940,000.00	930,087.78	1,194,432.00	1,147,510.73	1,300,000.00	1,279,347.28	1,300,000.00	1,294,049.78
Salaries, Lighthouse Service.	375,000.00	368,174.47	380,000.00	357,925.44	380,000.00	367,980.56	383,000.00	382,184.79	400,000.00	391,140.16
Salaries, lighthouse vessels..	1,070,000.00	964,578.71	1,104,650.00	1,007,308.45	[a] 1,465,000.00	1,418,477.25	1,775,000.00	1,759,041.51	1,870,000.00	1,856,277.14
General Expenses, Lighthouse Service.	2,790,000.00	2,759,212.93	2,850,000.00	2,654,190.20	[b] 4,039,297.00	3,907,567.52	4,000,000.00	3,975,088.33	4,600,000.00	4,525,760.67
Additional Compensation [c] ..	.....	.....	260,024.00	260,024.00	375,252.00	375,252.00	884,319.00	884,319.00	884,785.00	884,785.00
Retired Pay	.....	.....	.....	.....	30,000.00	22,335.37	65,000.00	61,769.44	71,000.00	68,887.77
Total Maintenance	$5,239,030.00	$5,085,330.46	$5,599,904.00	$5,269,367.89	$7,549,411.00	$7,297,910.30	$8,472,749.00	$8,400,329.93	$9,194,075.00	$9,084,864.28
Special Works										
New light and fog signal stations.	$193,000.00	.....	$155,000.00	.....	$80.000.00	.....	$26,000.00	.....	.....	.....
Lightships	.....	.....	280,000.00	.....	.....	.....	450,000.00	.....	.....	.....
Lighthouse tenders	20,000.00	.....	210,000.00	.....	.....	.....	760,000.00	.....	.....	.....
Keepers' dwellings	.....	.....	.....	.....	.....	.....	50,000.00	.....	.....	.....
Improvement of aids.....	736,000.00	.....	613,300.00	.....	795,000.00	.....	393,000.00	.....	.....	.....
Lighthouse depots	50,000.00	.....	21,000.00	.....	288,000.00	.....	42,000.00	.....	.....	.....
Radio fog signals.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total Special Works....	$999,000.00	$651,629.45	$1,279,300.00	$499,633.24	$1,163,000.00	$880,958.40	$1,721,000.00	$1,006,501.26	.....	$1,185,355.26
Grand Total	$6,238,030.00	$5,736,629.45	$6,879,204.00	$5,769,001.13	$8,712,411.00	$8,178,868.70	$10,193,749.00	$9,406,831.19	$9,194,075.00	$10,270,219.54

[a] Includes $200,000.00 transferred from "Pay of the Navy, 1919."
[b] Includes $539,297.00 transferred from the following Navy Appropriations:
Emergency expenses, Bureau of Yards and Docks, 1919..... $98,788.50
Engineering, Bureau of Steam Engineering, 1919..... 183,788.50
Construction and Repair, Bureau of Construction and Repair, 1919..... 206,720.00
Provisions, Navy, Bureau of Supplies and Accounts, 1919-20..... 50,000.00
[c] Indefinite appropriation based on the amount necessary to pay the bonus.

APPROPRIATIONS AND EXPENDITURES: FISCAL YEARS 1912 TO 1926, INCLUSIVE—*Concluded*

Object	1922		1923		1924		1925		1926	
	Appropriation	Expenditure	Appropriation	Expenditure	Appropriation	Expenditure	Appropriation	Expenditure	Appropriation	Expenditure
Maintenance										
Salaries, Bureau of Lighthouses.	$68,290.00	$67,604.51	$68,290.00	$67,500.09	$68,290.00	$63,000.00	$90,000.00	$84,573.67	$89,880.00	
Salaries, keepers of lighthouses.	1,300,000.00	1,294,203.70	1,300,000.00	1,266,327.09	1,300,000.00	1,255,731.54	1,685,300.00	1,680,338.35	1,970,000.00	
Salaries, Lighthouse Service.	400,000.00	397,203.05	400,000.00	395,800.51	400,000.00	392,043.59	530,580.00	526,834.03	548,600.00	
Salaries, Lighthouse vessels.	1,800,000.00	1,691,385.10	1,700,000.00	1,577,038.71	1,720,000.00	1,711,506.84	2,200,000.00	2,216,156.45	2,220,000.00	
General Expense, Lighthouse Service.	4,200,000.00	4,168,627.19	[b]4,205,000.00	4,135,964.65	[d]4,200,000.00	3,869,182.58	4,264,500.00	3,884,457.64	4,039,500.00	
Additional Compensation [c] ..	905,759.00	905,759.00	905,454.00	905,454.00	902,208.63	902,208.63	.....	.....	.....	
Retired Pay	75,000.00	74,907.83	89,000.00	86,294.00	97,000.00	96,773.23	125,000.00	122,743.78	110,000.00	
Total Maintenance	$8,749,049.00	$8,599,690.38	$8,667,744.00	$8,434,379.05	$8,687,498.63	$8,290,446.41	$8,895,380.00	$8,515,103.92	$8,977,980.00	
Special Works										
New light and fog signal stations.	.....	.....	.....	.....	$66,000.00	.....	$160,000.00	.....	$148,000.00	
Lightships	$1,000,000.00	.....	.....	.....	90,000.00	.....	.....	.....	.....	
Lighthouse tenders	.....	.....	.....	.....	150,000.00	.....	100,000.00	.....	485,000.00	
Keepers' dwellings	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Improvement of aids.....	13,500.00	.....	$553,500.00	.....	180,200.00	.....	252,000.00	.....	76,000.00	
Lighthouse depots	.....	.....	110,000.00	.....	226,800.00	.....	40,000.00	.....	.....	
Radio fog signals.....	.....	.....	.....	.....	.....	.....	21,000.00	.....	16,000.00	
Total Special Works.....	$1,013,500.00	$1,296,763.87	$663,500.00	$978,389.14	$713,000.00	$941,614.97	$573,000.00	$615,333.99	$725,000.00	
Grand Total	$9,762,549.00	$9,896,454.25	$9,331,244.00	$9,412,768.19	$9,400,498.63	$9,232,061.38	$9,468,380.00	$9,130,437.91	$9,702,980.00	

[a] Cash basis.
[b] Includes $5,000 transferred from "Naval training station Great Lakes buildings" and $29,265 transferred to same object under Navy Department.
[c] Indefinite appropriation based on the amount necessary to pay the bonus.
[d] Includes $51,878 transferred to same object Navy Department.

Summary of Costs, Fiscal Year 1925 [1]

TOTAL COSTS OF PRINCIPAL FEATURES

Feature	Maintenance expenses					Betterment expenses					Grand total	Per cent
						Repairs and improvements			New works	Total		
	Salaries	Subsistence	General supplies	Incidental expenses	Total	Hired labor	Materials	Contract work				
Administration [a]	$521,998	[b] $36,672	$27,732	$10,320	$596,722	.....	.....	.....	.....	.....	$596,722	6.3
Distributive charges [c]	1,728,079	316,150	823,680	42,847	2,910,756	$102,358	$118,528	$209,688	$137,692	$568,266	3,479,022	36.8
Aids to navigation [d]	2,801,756	352,204	945,061	22,124	4,121,146	293,392	382,584	137,426	438,898	1,252,301	5,373,447	56.9
Total	$5,051,833	$705,026	$1,796,473	$75,291	$7,628,624	$395,750	$501,112	$347,114	$576,590	$1,820,567	$9,449,191	100.0

[a] Includes offices, except expenses of publication.
[b] Includes transportation and other traveling expenses.
[c] Includes depots and tenders; also item excepted above, charged to supplies.
[d] Includes light vessels, light stations, minor fixed aids, and buoys.

[1] From Annual Report, 1925, p. 10. Amounts are stated to nearest even dollar.

TOTAL COSTS OF DETAILED FEATURES

Feature	Maintenance expenses					Betterment expenses					Grand total	Per cent
						Repairs and improvements			New works	Total		
	Salaries	Subsistence	General supplies	Incidental expenses	Total	Hired labor	Materials	Contract work				
Offices	$521,998	$36,672	$52,977	$10,320	$621,967	.....	.....	.....	.....	.....	$621,967	6.6
Depots	280.194	.....	178,366	15,575	474,115	$37.543	$32,135	$12,505	$31,287	$113,470	587,585	6.2
Tenders:												
Large	$377,300	$86,481	$183,784	$5,462	$653,027	$8,359	$14,687	$69,222	.....	$92,268	$745,295	7.9
Medium	930,726	201.483	395,748	16,606	1,544.563	32,148	52,832	109,527	$106,405	300,912	1,845,475	19.5
Small	139,879	28,186	40.537	5,204	213,806	24,308	18,874	18,434	.....	61,616	275,422	2.9
Total	$1,447,905	$316,150	$620,069	$27,272	$2,411.395	$64,815	$86,393	$197,183	$106,405	$454,796	$2,866,192	30.3
Lightships:												
Exposed	$342,967	$55.735	$97.931	$1,351	$497,985	$10,816	$19,372	$26,120	$40,792	$97,100	$595,085	6.3
Moderately exposed	211,019	34,789	39,005	206	285,019	3,164	6,032	24,016	.....	33,212	318,231	3.4
Relief	139,470	24,482	38,410	348	202,710	24,587	15,920	9,859	.....	50,366	253,076	2.7
Lakes	83,844	15,460	10,965	453	110,722	4,114	8,627	2,640	.....	15,381	126,103	1.3
Total	$777,300	$130.466	$186,311	$2.358	$1,096,436	$42,681	$49,951	$62,635	$40,792	$196,059	$1,292,495	13.7
Light stations:												
Primary seacoast and lake lights	$483.464	$68,725	$117,944	$5,508	$675,641	$64,218	$72,968	$19,475	$179,637	$336,298	$1,011,939	10.7
All other lights (except post lights)	1,195,980	153,013	246,266	12,770	1,608,029	141,774	216,494	39,862	205,647	603,777	2,211,806	23.4
Post lights	286,888	.....	46,260	1,048	334,196	6,547	17,982	5,555	.....	30,084	364,280	3.9
Day marks and spindles.	452	.....	420	440	1,312	3,625	5,350	1,214	1,523	11,712	13,024	0.1
Total	$1,966,784	$221,738	$410,890	$19,766	$2,619,178	$216,164	$312,794	$66,106	$386,807	$981,871	$3,601,049	38.1
Buoys	$57,672	.....	$347,860	.....	$405,532	$34,547	$19,839	$8,685	$11,300	$74,371	$479,903	5.1
Grand total	$5,051,833	$705,026	$1,796,473	$75,291	$7,628,624	$395,750	$501,112	$347,114	$576,590	$1,820,567	$9,449,191	100.0

AVERAGE COST OF SELECTED FEATURES

Average cost of—	Salaries	Subsistence	General supplies	Incidental expenses	Total maintenance	Repairs and improvements	Total cost
District office, exclusive of third	$19,576	$475	$440	$546	$21,036	.....	$21,036
District depot, exclusive of general depot	4,749	.....	2,603	372	7,724	$2,069	9,793
Large tender, Pacific	37,888	9,243	20,924	566	68,621	8,715	77,336
Large tender, Atlantic	37,625	8,252	16,681	533	63,091	9,568	72,659
Medium tender	29,251	6,298	11,716	420	47,685	6,100	53,785
Exposed lightship	17,148	2,787	4,897	68	24,900	2,815	27,715
Moderately exposed lightship	12,413	2,046	2,291	12	16,766	1,954	18,720
Lake lightship	8,276	1,526	1,092	44	10,938	1,340	12,278
Primary seacoast light station	3,328	474	803	38	4,643	1,064	5,707
Other light station (except post lights)	507	65	105	5	682	169	851
Post light, river district	102	.....	8	.....	110	1	111
Post light, other district	99	.....	31	1	131	27	158

APPENDIX 7

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Explanatory Note

The bibliographies appended to the several monographs aim to list only those works which deal directly with the services to which they relate, their history, activities, organization, methods of business, problems, etc. They are intended primarily to meet the needs of those persons who desire to make a further study of the services from an administrative standpoint. They thus do not include the titles of publications of the services themselves except in so far as they treat of the services, their work and problems. Nor do they include books or articles dealing merely with technical features other than administrative of the work of the services. In a few cases explanatory notes have been appended where it was thought they would aid in making known the character or value of the publication to which they relate.

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